

New Mexico Highway 50 Transportation Study

Phase A: Initial Evaluation of Alternatives

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A Collaborative Project of the:
National Park Service/Pecos National Historical Park
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Introduction

The National Park Service (NPS), Federal Highway Administration (FHWA), and New Mexico Department of Transportation (NMDOT) have joined forces to study potential alternatives for the segment of New Mexico Highway 50 that traverses Pigeons Ranch in the vicinity of the Glorieta Unit of Pecos National Historical Park. The study area is located 20 miles east of Santa Fe, New Mexico and focuses on the corridor of New Mexico Highway 50 from the Village of Pecos to the existing interchange with Interstate 25 (Exit 299).

This report documents the process and results of the first phase of the study effort, referred to as Phase A: Initial Evaluation of Alternatives. Study efforts have been completed in accordance with the NMDOT *Location Study Procedures, A Guidebook for Alignment and Corridor Studies* (2000).

The general purpose of this study has been to identify and evaluate potential alternatives and provide recommendations for preserving and enhancing public access to the Civil War era Glorieta Battlefield and Pigeons Ranch, while also improving the safety of the roadway for local residents, park visitors, the community of Pecos, and travelers through the area.

Completion of this report occurred over the course of about 16 months, from the fall of 2005 through early 2006. The agency partners actively engaged community representatives, special interest groups, and the public-at-large in developing and analyzing a range of potential options and alternatives throughout the study process. The public involvement and outreach program included three workshop series. The first workshop series took place in late January 2005, the second in mid-June 2005, and the third workshop series in late October 2005. A public open house meeting is being scheduled for June 2006 to present the results of the Phase A study efforts.

With completion of Phase A, the study has moved into Phase B. In Phase B, alternatives are developed

in greater engineering detail. A detailed analysis is also conducted to determine their performance, right-of-way needs, costs, and the potential environmental, social and cultural consequences of each. Eventually, the study will move into Phase C. Phase C is the preparation of an environmental assessment (EA) or an environmental impact statement (EIS) and subsequent processing that concludes the corridor study process and allows the selected alternative to be advanced to the preliminary and final design phase.

The study process has been and will continue to be comprehensive, context-sensitive, and fully inclusive of public participation.

Analysis of Existing Conditions and Constraints

The assessment of existing conditions included in this report involved two steps: (1) inventorying the study area's existing natural, cultural, social, and physical features; and (2) evaluating these features to determine which, if any, could potentially limit the location and/or type of transportation improvements that may be needed. Additional analysis and environmental assessment will be completed in Phase B.

Development of Study Alternatives and Preliminary Evaluation of Alternatives

The alternatives development process took place throughout the duration of the Phase A study and was a collaborative effort between the steering committee and the consultant team, directly shaped by public involvement.

The process began with the development of fifteen early concepts that were based on public input and ongoing analysis of existing conditions. The concepts were categorized into three sets and

presented to the public in June 2005 for further input and comment. The concepts included:

- Set One: Low Build, No Build and No Action
- Set Two: Realignment/Bypass Concepts
- Set Three: New Route Possibilities – Between NM 50/Pecos and Interstate 25

In August 2005, the NM 50 Transportation Study steering committee met to review the fifteen concepts. With consideration of public comments and insights gained from preliminary analysis of the concepts, the team developed five alternatives to take forward to the public and another round of analysis. The five alternatives were presented to the public in a workshop series in October 2005. Workshop participants provided general comments and also were encouraged to assess the alternatives by comparing each to the set of evaluation criteria established with public input earlier in the study process. Participants were given blank evaluation matrices to fill out.

Following the October 2005 public meetings, preliminary alignment engineering and cost estimates were completed for the five alternatives. The steering committee then met to determine if any alternatives should be eliminated based on public input, ongoing evaluation of existing conditions and environmental constraints, and the technical analysis related to preliminary alignment engineering and associated cost estimates. The steering committee/study team determined that Alternatives 3 and 4 should be dismissed from further study and that Alternatives 1, 2 and 5 should proceed into Phase B.

Therefore, the three alternatives moving forward into Phase B include:

Alternative I (Formerly Alternative 1) – No Action

This is the “No Action” alternative. Although there are concerns that this alternative would not meet the purpose of and need for the project, the National Environmental Policy Act (NEPA) typically requires that a “No Action” alternative be carried forward for further analysis.

Alternative II (Formerly Alternative 2) – Low Build/Improvements to Existing Alignment

This alternative would include development of gateways to the Pigeons Ranch area of the park, traffic calming and pull off areas along the existing alignment, and some shoulder widening where possible within the corridor. This alternative also would include a slight shift of the highway to the south in the vicinity of the historic adobe structure to aid its long-term preservation.

Alternative III (Formerly Alternative 5) – New Alignment and New Interchange on I-25

This alternative would involve development of a new link between the existing alignment of NM 50 and Interstate 25, and a new interchange. The new alignment and interchange would be constructed in a somewhat central location between the western outskirts of the Village of Pecos and the Glorieta Unit of the park. With development of this new alignment, it is envisioned that the existing segment of NM 50 would remain open for access to the park and residences in the vicinity and would become more of a “local” access road with lower traffic volumes and slower traveled speeds.

Next Steps

This report concludes Phase A of the study process. The NPS, FHWA, and NMDOT are committed to moving the project forward, seeking funding, and continuing to work together on ongoing study efforts. Although Phases B and C are not yet fully funded, some funding is available to support Phase B study efforts. As such, Phase B is proceeding ahead and initially will focus on additional preliminary engineering related to the alternatives and later will involve detailed environmental analysis. It is envisioned that Phase B will be completed within the next 15 to 18 months, and Phase C will be completed within three years as funds become available for environmental documentation. After completion of Phase C, the project will move forward through implementation.

General Overview

The National Park Service (NPS), Federal Highway Administration (FHWA), and New Mexico Department of Transportation (NMDOT) have joined forces to study potential alternatives for the segment of New Mexico Highway 50 that traverses Pigeons Ranch in the Glorieta Unit of Pecos National Historical Park. Anticipated long-term benefits of a successful alternative include improved transportation access and safety for the region, enhanced park preservation and interpretation efforts, and local economic development through improved transportation and park experience opportunities for visitors. This report documents the process and results of the first phase of the study effort, referred to as Phase A: Initial Evaluation of Alternatives.

Study Area Context

The study area is located 20 miles east of Santa Fe, New Mexico and focuses on the corridor of New Mexico Highway 50 from the Village of Pecos to the intersection with Interstate 25 (Exit 299). The study area includes the Glorieta Unit of Pecos National Historical Park, as well as surrounding areas. The study area encompasses additional public and private lands to the north of the Glorieta Unit; as well as lands between the Glorieta Unit and the Village of Pecos to the east; lands to the south of and along the I-25 corridor; and lands west of the park unit to the Glorieta interchange.

This corridor has a multiple-layered history as the site of Native American settlements dating back at least 12,000 years, as well as later Spanish settlements. The corridor also encompasses original segments of the Santa Fe National Historic Trail and historic Route 66. One of the most predominant historical influences in the specific study area was the Civil War era battle fought at Glorieta, where Union and Confederate troops engaged in a decisive battle for control of the western states in March 1862. Most major movements and activities of the battle occurred



NM 50 serves as the main connector between I-25 and the Village of Pecos.

in the core of this unit of Pecos National Historical Park. An adobe structure at Pigeons Ranch and other elements in the landscape in place at the time of the battle still stand today. The current alignment of NM Highway 50 bisects the historic battlefield and Pigeons Ranch, aligning closely to the adobe building.

Today, NM 50 serves as the main connector for ever-increasing commuter traffic levels from the Pecos region to the City of Santa Fe. The route carries traffic from Pecos and surrounding areas to and from the Glorieta interchange with I-25. Automobile and freight traffic levels have been increasing as a result of rapid growth in the region, and NMDOT forecasts that traffic levels will continue to rise along this corridor in the coming years.

Figure 1 illustrates the study area context. All figures are located at the end of this document.

Study Process and Schedule

In accordance with the NMDOT *Location Study Procedures, A Guidebook for Alignment and Corridor Studies* (2000), the guideline document for this study, Phase A is the first phase of a three-phase corridor study process. The purpose of the Phase A study effort is to identify and evaluate potential alternatives that will preserve and provide public access to the Civil War era Glorieta Battlefield and Pigeons Ranch,



Adobe structure on NM 50, located in the Glorieta Unit of Pecos National Historical Park

while also improving the safety of the roadway and transportation connectivity for local residents, park visitors, the community of Pecos, and other travelers through the area. Phase A steps have included the following.

1. Develop and implement an agency coordination and public involvement program.
2. Establish and verify the purpose and need for the proposed transportation improvement.
3. Identify the existing physical, economic, environmental, social and cultural conditions within the study area.
4. Identify the range of alternatives that could be used to address the purpose and need.
5. Perform a preliminary evaluation of each alternative for its ability to achieve the purpose and need, operational performance engineering feasibility, constructability, safety benefits, cost, right-of-way requirements, drainage needs, and environmental, social, and cultural effects.
6. Identify the environmental processing actions necessary for federal authorization.

With completion of Phase A, the study has moved into Phase B. In Phase B, alternatives are developed in greater engineering detail. A detailed analysis is also conducted to determine their performance, right-of-way needs, costs, and the potential environmental, social and cultural consequences of each. Eventually,

the study will move into Phase C. Phase C is the preparation of an environmental assessment (EA) or an environmental impact statement (EIS) and subsequent processing that concludes the corridor study process and allows the selected alternative to be advanced to the preliminary and final design phase.

Completion of Phase A occurred over the course of about 16 months from the fall of 2005 through early 2006. After initial coordination meetings, the agency partners retained a consultant team to assist in developing and analyzing potential alternatives for this segment of the highway. Public and stakeholder involvement and community outreach has been an integral part of the study process. An agency coordination and public involvement program was developed specifically for the study, in accordance with NMDOT's *Location Study Procedures, A Guidebook for Alignment and Corridor Studies*. The agency partners have actively engaged community representatives, special interest groups, and the public-at-large in developing and analyzing a range of potential options and alternatives throughout the study process. In addition to ongoing agency coordination and public involvement, major tasks completed during the Phase A study process included:

- Data collection, information gathering and base mapping
- Analysis of existing conditions
- Development of evaluation criteria
- Identification and presentation of potential ideas and concepts
- Development of an initial range of alternatives
- Evaluation and further screening of alternatives

Figure 2 depicts the Phase A study process and schedule.

Prior Activities

Previous planning and study efforts related to NM 50 occurred several years ago. These efforts were separate and independent endeavors from the current study process. In 1985, NMDOT (formerly the New Mexico State Highway and Transportation Department – NMSHTD) began plans to reconstruct

and widen NM 50 in response to increased development and traffic. Road improvement plans were delayed as the project encountered issues and concerns related to historic resources and local residents.

In 1990, US Congress added the Glorieta Unit to Pecos National Historical Park to preserve the historic Civil War era battlefield and other historical and cultural resources on the site. The NMDOT subsequently altered road improvement plans to exclude the section of NM 50 within the NPS battlefield boundary, but the road improvements on remaining sections (east of the Glorieta Unit) proceeded.

In 1993 the NMDOT began a new study to assess the feasibility of alternate highway routes as a result of the new constraints placed on the widening of NM 50 within the battlefield area, now dedicated as a national park unit. Another 1993 NPS historic resource study on the sole remaining structure from the historic battlefield period (the Pigeons Ranch adobe building) called for enhanced protection for the structure from seismic impacts of the adjacent roadway. NMDOT halted their study of alternatives in 1996, citing a lack of funds and the lack of a feasible alternative among those studied.

In 2001, the National Park Conservation Association and Civil War interest groups began to mobilize for battlefield protection and produced a study of economic benefits from battlefield-related tourism in addition to a pamphlet advocating relocation of the segment of NM 50 that extends through the park unit. In 2003 and 2004, the Glorieta Battlefield was listed as one of the ten most endangered Civil War sites in the country by the Civil War Preservation Trust.

Subsequently, funds were authorized for a new study effort through the Federal Lands Highway Program (FLHP) Discretionary Fund. In a renewed commitment to work closely together and to actively engage the surrounding community and general public in identifying and evaluating the best possible range of alternatives for NM 50, the NPS, FHWA, and NMDOT then joined forces to initiate this current study process.

Agency Coordination

Introduction

The study process began with the initiation of a Partnership Agreement signed in Spring 2004 by the National Park Service (NPS), Federal Highway Administration (FHWA), and New Mexico Department of Transportation (NMDOT). The agreement specified the expectations of the parties and delineated the project steering committee, comprised of representatives from each agency for the purpose of defining the responsibilities and actions necessary to conduct the transportation study. The commitment outlined in the agreement constituted a good faith effort by all parties to work together to identify resources that each party would offer to the transportation study and any subsequent work. All project documentation was coordinated by the project steering committee to ensure compliance with environmental requirements.

Steering Committee Work Plan

The project Steering Committee met monthly during the course of the Phase A study. The work plan for these meetings and the Steering Committee is presented below. The advantage of having a well-defined work plan is that it keeps the core team on track, and helps make sure Steering Committee members are aware of upcoming responsibilities and activities that required their attention.

Meeting 1 - August 2004: Introduction to the team; review of project purpose/goal and presentation of study approach and schedule

Meeting 2 - October 2004: Discussed study tasks and schedule, public involvement plan, draft project information sheet and press release, other work in process; base mapping, status of data and information needs

Meeting 3 - November 2004: This meeting focused on details related to existing conditions



Several public meetings took place during the Phase A study process.

inventory and analysis, base mapping and preparations for the late January workshops

Meeting 4 - December 2004: Reviewed and discussed status of workshop presentation materials and workshop coordination activities; began to discuss parameters related to development of alignment options; screening/evaluation criteria

Meeting 5 - January 2005: Steering Committee meeting occurred during the community workshop series (week of January 24th) in Pecos; discussed existing conditions analysis results; continued to discuss parameters related to development of alignment options; and screening/evaluation criteria

Meeting 6 - February 2005: Discussed results of workshops; initial concepts being developed

Meeting 7 - March 2005: Discussed initial concepts being developed and materials/coordination for upcoming early June meetings/open house

Meeting 8 - April 2005: Presented and reviewed initial concepts developed for presentation to the public discuss fatal flaws, comments and issues to be included in the alternatives comments matrix presented to the public in the upcoming meetings/open house; discussed meeting notices and coordinated on other outreach activities

Meeting 9 - May 2005: Discussed preparations for upcoming meetings/open house and refinements to initial concepts and comments to summary matrix

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Meeting 10 - June 2005: No meeting; public meetings and open house occurred in the second week of June

Meeting 11 - July 2005: Discussed public meetings/open house results, refinement of concepts and analysis in process

Meeting 12 - August 2005: Discussed ongoing refinement of concepts and development of alternatives and related analysis in process

Meeting 13 - September 2005: Presented and reviewed set of alternatives and draft presentation materials (of draft study highlights) for the upcoming public outreach meetings in October

Meeting 14 - October 2005: Discussed comments on alternatives, presentation materials, and study highlights and changes to be made prior to public outreach in late October; public meeting/workshop series held in late October

Meeting 15 - November 2005: Discussed results of public outreach and alternatives refinements needed, and packaging of the draft study document

Meeting 16 - December 2005: No meeting

Meeting 17 - January 2006: Confirmed potential alternatives to be carried forward into further Phase B study efforts based on public input and ongoing analysis of environmental conditions and constraints; reviewed draft study outline

Meeting 18 - February 2006: Presented first draft of Phase A study for steering committee review; reported on Phase B study efforts

Meeting 19 - March 2006: Reviewed steering committee comments on draft study; discussed delivery of final study and associated public outreach; reported on Phase B study efforts

March 20 - April 2006: Finalized outstanding information for Phase A Study; discussed format and schedule for upcoming public meetings

Next Steps for Agency Coordination

The NPS, FHWA, and NMDOT are committed to working together to refine and further study the alternatives and seek funding for implementation. Steering committee meetings are planned to continue following this phase of the study. The decision-making process will be a collaborative process with continued public involvement.

Public Involvement

Introduction

The Phase A study was shaped by a comprehensive public outreach effort that engaged the public and community in developing and evaluating possible transportation solutions and alternatives for NM 50. The agency partners (NPS, NMDOT, FHWA) developed a multi-layered public involvement and community outreach program that provided extensive opportunities for involving the community and various project stakeholders and gathering public comments and input. The general public, community stakeholders, and various interested



Workshop participant reviewing presentation boards

groups and individuals were involved from the early stages of identifying potential options for resolving transportation problems all the way through later stages of the study related to evaluation of feasible alternatives. Following this phase of study, public involvement activities will continue through ongoing environmental analysis, selection of a preferred alternative, and implementation of study recommendations.

The public involvement and outreach program included three workshop series. The first workshop series took place in late January 2005, the second in mid-June 2005, and the final workshop series in late October 2005. Numerous publications and materials were distributed before and after the workshop series including project information sheets, questionnaires, comment forms, newsletters, press releases, and summary reports. Each workshop series was constructed to actively engage all stakeholders and the public to gain valuable input through each stage of the project.

The following information summarizes the methods used and information gathered during the public involvement and community outreach efforts for the New Mexico Highway 50 Transportation Study. Full details of the public involvement process and input received can be found in Appendix A, Public Involvement and Community Outreach Summary for Phase A of the NM 50 Transportation Study.

Outreach Methods

Several outreach tools were used throughout the entire project to inform the public about the Highway 50 Transportation Study, as well as to notify people about meetings and open houses. Below is a list of the on going outreach methods used for the project. Project notices were advertised in local papers and available in Spanish. Translation services were available at each meeting upon request and stated in Spanish on the Project Information Sheet. Appendix B includes samples of each of the following public outreach tools.

Project Information Sheet

A one-page, double-sided, color informational piece

developed to provide a project description, schedule, meeting announcements, and contact information was updated throughout the course of the study.

Project Newsletter

A two-page, double-sided informational piece developed to provide a summary of the workshop series and provide additional information about upcoming meetings.

Press Releases and Calendar Notifications

Project and meeting information were distributed to local newspapers for publication.

Interactive Workshops with Stakeholder Groups

Stakeholder groups were invited to attend small, interactive workshop sessions. In Workshop Series #1, stakeholders were grouped into categories of like-interests to facilitate open and effective discussions. In Workshop Series #2 and #3, a variety of interests were grouped together so that participants could gain insights into the perspectives, concerns, and ideas of others.

General Public Workshops

Evening meetings were held for the general public and stakeholders not able to attend day meetings. The typical format included a brief presentation and activities to prompt participation. Participants were given ample opportunity to provide comments and ideas.

Open Houses

Saturday open houses were held for the public to view presentation boards with draft information and provide additional feedback and comments. Team members were available to talk to participants one-on-one and answer questions as needed.

Tribal Outreach

Members of the steering committee and project team gave a brief presentation and project overview to representatives from the Jemez Pueblo on January 25, 2005.

Meeting Announcement Mailer

A brief project description and meeting announcement flyer was mailed to area residents with addresses in Pecos, Glorieta, Rowe, and Terrero for the Workshop Series.

Email and Phone

An email address was set-up specifically for this project. The email address is hwy50transtudy@otak.com. A project phone number was also established, it is (800) 370-6148. The email address and phone number remained active throughout the duration of the project.

Comment Cards & Questionnaires

Comment cards & questionnaires were handed out at the public workshops, meetings, and open houses. Comment cards and questionnaires provided another means for participants to provide input on the project.

Workshop Series Summaries

Workshop Series #1

The first stage of outreach involved a week-long interactive workshop series from January 24 through January 29, 2005. The process included focus-group workshop sessions, an evening public meeting, and a

Saturday open house, all held at the Village of Pecos community room. Over 200 people participated in these meetings. Two public evening meetings were originally scheduled for the week, but due to snowy weather conditions, one evening meeting was rescheduled for February 23, 2005 in Glorieta. Each workshop session and the public meetings included a brief project presentation, interactive exercises, and time at the end for questions and answers. The open house, held on a Saturday, displayed all the comments and ideas generated from the workshop sessions and evening meeting.

Workshop Series #1 included two interactive activities for participants. The Visioning Exercise was designed to lead participants through a brainstorming session, where they could imagine a preferred future for Highway 50 through the Glorieta Unit in Pecos National Historical Park. In the Evaluation Criteria Exercise, individuals began identifying and prioritizing criteria that should be considered during the development of preliminary concepts and alternatives for the Highway 50 Transportation Study. A diversity of opinions and a wide range of ideas and suggestions were offered by participants during the exercises. A summary of the outcomes of both exercises is provided below.

Visioning Exercise

- There was broad agreement that traffic congestion and safety problems exist on NM Highway 50.
- Traffic needs to slow down on Highway 50.
- Highway 50 should not be widened because that might impact historic features and increase speeds even more.
- Consider lowering speed limit through the park.
- Many people felt there was a need for an alternative route of access between Pecos and Interstate 25.
- Visitor improvements and interpretation in the Glorieta Unit will enhance the visitor experience and increase awareness of the unique history of the battlefield.
- Environmental, cultural, and historical goals of the park should be accomplished without



Workshop participants at October 2005 workshop

disrupting the community and people who live in the area.

- All transportation alternatives studied should avoid negative impacts to the La Joya neighborhood.
- The Glorieta Unit should continue to be accessible to be a “no fee” area.
- Continue to provide access to and from and preserve property rights of parcels within and near the Glorieta Unit.
- Preserve and enhance the quality of life enjoyed by the community of Pecos and residents of the area and retain the rural character of the area – quiet and peaceful.
- Consider highway realignment and Interstate 25 access opportunities inside of the park and not just through surrounding private properties.
- Strengthen partnerships between the Pecos community, counties, and the agencies involved in this study.
- Consider visual impacts, as well as impacts to vegetation. Save trees and native vegetation.

Evaluation Criteria Exercise

In the Evaluation Criteria Exercise, participants were given three presentation boards listing 18 evaluation criteria topics and a blank board where new criteria topics could be written. Each person was given 10 red dot stickers and then asked to place dots next to criteria topics they felt were most important, including any new criteria topics attendees had added.

Following are the criteria topics participants felt were most important to consider during evaluation of preliminary concepts and alternatives (in order of importance).

- Police, fire, and emergency services
- Important archaeological and cultural resources and historic sites
- Aquatic resources such as streams, rivers and associated riparian habitat, and wetlands; floodplains and drainage considerations
- Important visual resources/views/impacts to scenic qualities



Workshop participants listening to the presentation during Workshop Series #2 in June 2005

- Noise abatement in sensitive areas
- Context sensitive and sustainable solutions
- Neighborhood cohesion, safety, and community services
- Community values
- Interpretive opportunities associated with National Park Service resources
- Biological resources, including threatened and endangered species and important habitats

Workshop Series #2

The second series of outreach involved a three-day interactive workshop and public meeting series held June 16 through June 18, 2005. The process included four focus-group workshops, an evening public meeting, and three daytime public meetings on Saturday.

The purpose of Workshop Series #2 was to review comments and ideas from Workshop Series #1; to explore and refine concepts developed to date based on those comments; and to get input on draft evaluation criteria and remaining steps in the study process. Each meeting included a presentation on the overall goals and objectives of the entire study, a history of the Glorieta Unit of Pecos National Historical Park, a summary of “what we heard” during Workshop Series #1, a “toolbox” of potential transportation solutions, and an introduction to the fifteen transportation concepts. After the

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presentation, the project team gave a brief description of each of the fifteen concepts, answered questions, and recorded comments for each. The fifteen concepts for addressing the area's transportation needs and problems were categorized and presented in three sets during Workshop Series #2:

- Set One: Low Build, No Build, and No Action Concepts
- Set Two: Realignment/Bypass Concepts
- Set Three: New Routes Between NM 50 and I-25

Descriptions and maps of the fifteen concepts are located later in this study under "Development of Study Alternatives & Preliminary Evaluation of Alternatives."

Set One: Low Build, No Build, and No Action Concepts

These concepts as potential solutions on their own did not receive very much interest or support by Workshop Series #2 participants. Most participants felt that these concepts would not fully address transportation needs or resolve problems, unless they were implemented as accompaniments to other options. For example, many of the workshop participants who supported concepts that would involve realignment of NM 50 and/or development of a new interchange also felt that slowing of traffic on NM 50 through the park was a good idea.

Set Two: Realignment/Bypass Concepts

Although workshop participants were generally intrigued by some of the possible realignment concepts shown, many raised concerns about potential impacts to private property, as well as natural and cultural resources. Workshop participants felt that some of these concepts showed more promise than others. Several workshop participants stated that it would be important to upgrade the Glorieta interchange to improve its function and efficiency in conjunction with any of these realignment concepts. Many workshop participants also stated that some of the concepts shown would not be viable without development of a new linkage to NM 50. The linkage was seen as essential to address the commuter traffic needs of the area and without this

linkage, motorists would continue to use the old route through the park (see more information below under discussions related to individual comments).



Workshop participants reviewing maps and providing comments

Set Three: New Routes Between NM 50 and I-25

Many workshop participants were supportive of the potential to create a new link between the Pecos vicinity and Interstate 25. The majority felt that an approach like this would serve long-term regional transportation needs and solve many problems related to access and traffic.

Although many expressed interest in creating a new access route and interchange with I-25, several workshop participants were concerned about the implications of additional population growth and development in the area that might occur if new transportation improvements and facilities (such as an interchange) were developed. Concerns related to the potential cost of a new interchange were also stated. Several workshop participants strongly stated that if a new route is pursued in any of the areas shown, avoiding impacts to private residences to the full extent possible will be extremely important.

Workshop Series #3

The third stage of outreach involved a three-day interactive public workshop series held October 20-

22, 2005. The process included four focus-group workshops, an evening public meeting, and two daytime public meetings on Saturday. The purpose of Workshop Series #3 was to review comments and ideas from Workshop Series #2, present the refined alternatives, and obtain public comments on the five alternatives identified to move forward. Each meeting included a presentation on the overall goals and objectives of the entire study, a summary of “what we heard” during Workshop Series #2, an introduction of the five alternatives, and an explanation of the evaluation matrix. After the presentation, the project team gave a brief description of each of the five alternatives, answered questions, and wrote down comments for each alternative. Meeting participants also completed an evaluation matrix for each alternative.

The five alternatives for addressing the area’s transportation needs and problems are outlined below. Each alternative is described in more detail later in this study

1. Manage by Education, Enforcement, & Encouraged Use of NM 63
2. Gateways, Traffic Calming, and Pull Offs on Existing Alignment - Slight Shift of Highway to South
3. Extend Old Denver Highway; Connect to West End of NM 50; and Realign to Ascend Ridge and Join New Frontage Road
4. Extend Old Denver Highway and Connect to West End of NM 50 to Create a Centrally Located Linkage Between NM 50 and I-25
5. Centrally Located Linkage Between NM 50 and I-25 - New Interchange

Below is a brief overall summary of the comments received for each of the alternatives presented during Workshop Series #3. A full summary is provided in the Public Involvement and Public Outreach Summary, a separate document.

Alternative 1

There was not much interest in Alternative 1 as a stand alone alternative. Several people wanted to see Alternative 1 combined with one of the other

alternatives. Meeting attendees felt that Alternative 1 would do nothing for the park or to improve safety or address future traffic problems.

Alternative 2

There was not much support for Alternative 2 as a means to address existing and future issues related to NM 50. Public meeting participants thought it could be combined with one of the other alternatives without shifting the roadway alignment to the south. The signatory gateway and traffic calming seemed favorable but not as stand alone solutions.

Alternative 3

Some public meeting participants were supportive of this alternative. Other were not. Some people thought this alternative would have the least disruption to private properties but the most disruption to cultural and archaeological resources. Others were concerned about potential impacts to properties along the frontage road. Participants thought this would be an expensive alternative and only a minimal solution to the problems.

Alternative 4

Most meeting participants felt Alternative 4 would not adequately address the general traffic and safety problems facing the region. People also thought this alternative would impact the local community and property owners along the frontage road.

Alternative 5

The majority of public meeting participants felt Alternative 5 was the best fit since it would achieve the project purpose and need while also minimizing disruption to the surrounding community. People felt that this alternative would best accommodate future growth in the Pecos region and would address the inadequacy of the existing Glorieta interchange.

Project Purpose

The general purpose of the study is to identify and evaluate potential alternatives and provide recommendations that will preserve and provide public access to the Civil War era Glorieta Battlefield and Pigeons Ranch, while also improving the safety of the roadway for local residents, park visitors, the community of Pecos, and travelers through the area. The study process has been and will continue to be comprehensive, context-sensitive, and fully inclusive of public participation.

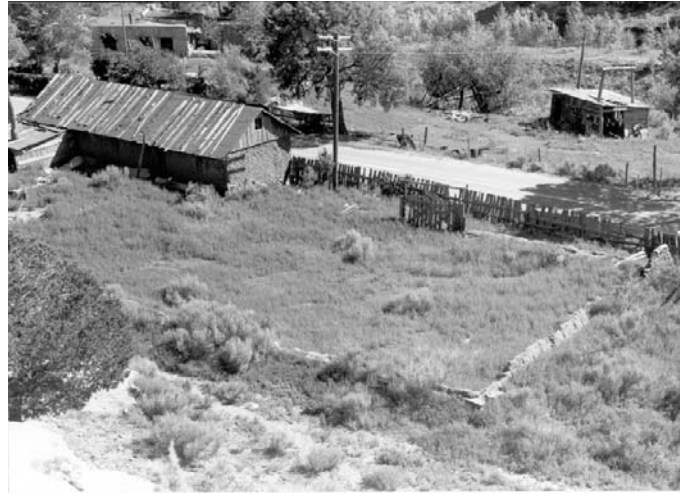
When the Glorieta Unit was established as a National Battlefield and enacted into the National Park Service as part of the Pecos National Historical Park (NHP), in 1990, the purpose was to “preserve and interpret the Civil War Battle of Glorieta for the benefit and enjoyment of present and future generations.”

Project Need

Transportation Safety and Mobility

New Mexico Highway 50 through the Glorieta Unit currently does not meet New Mexico Department of Transportation (NMDOT) or Federal Highway Administration (FHWA) standards for a roadway with its functional classification and volume. The existing roadway configuration of Hwy 50 includes two 11-foot travel lanes with approximately 1-foot shoulders on portions of the road and no shoulders on other portions. NM 50 has been upgraded to two 12-foot lanes with 4-foot shoulders east of the battlefield through the Village of Pecos.

NM 50 is an important rural, commuter, and freight route. It is a major roadway for east-west trips in the Glorieta-Pecos area to access I-25. It is also a tourist route providing access to the Glorieta Battlefield, Pecos NHP, Pecos Canyon Recreational Area, and National Forest lands. Annual Average Daily Traffic (AADT) in 2004 was 4,129. Projected AADT for 2025 is 6,529. Traffic is projected to increase at a



Historic photo of Pigeons Ranch and the Glorieta Battlefield

rate of approximately 2.8 percent per year. Heavy commercial truck traffic is projected to increase at a rate of 4.4 percent per year due to the forecasted population growth of the area, as well as increased logging activities north of the study area.

Historic Preservation and Interpretation

This corridor has a multiple-layered history as the site of Native American settlements dating back at least 12,000 years, an original segment of both the Santa Fe Trail and Route 66, and the site of the Civil War era Glorieta Battlefield, where Union and Confederate troops fought a decisive battle for control of the western states in March 1862. The 1997 General Management Plan for Pecos NHP discusses the need to restore the battlefield to its Civil War appearance and to make the site accessible to all visitors.

The lone remaining Civil War era adobe structure at Pigeons Ranch is listed on the National Register of Historic Places. The adobe structure is located about 3 feet from the NM 50 edge of pavement. This proximity to the travel lanes of the highway subjects the building to damaging vibration impacts. Preservation of the building is an important need.

PROJECT PURPOSE AND NEED

Goal

The primary goal of this project is to develop alternatives and steps to implement a long-term solution for resolving issues related to the growing transportation demands on New Mexico Highway 50. The need for transportation improvements must be balanced with preservation and interpretation goals at the Glorieta Unit of Pecos National Historical Park. The study process has been and will continue to be comprehensive, context-sensitive, and fully inclusive of public participation.

Objectives

Provide safe and efficient transportation options for Pecos residents and visitors.

- Improve the transportation efficiency for Highway 50 travelers.
- Evaluate all transportation options within realistic funding parameters.
- Protect private property values and safety of access and egress for park neighbors.

Preserve the historic resources of the battlefield.

- Manage the battlefield site in consideration of historic landscape values.
- Restore, preserve, and maintain historic structures and elements.

Allow interpretation of the historic resources and provide safe visitor access to the battlefield.

- Provide visual and/or onsite access to historic battlefield landscape.



View of the Pecos Valley

- Provide interpretive presentation to residents and other park visitors.
- Protect private lands from visitor trespass.

Ensure broad public involvement in the planning process.

- Maintain objectivity and public confidence in process and products of study.
- Identify stakeholders that represent the range of viewpoints of the community.
- Respectfully integrate all perspectives and values.
- Demonstrate the willingness of the agencies to show flexibility in methods to achieve objectives.

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

Introduction

This existing conditions profile for the New Mexico Highway 50 (NM 50) Transportation Study has been prepared in accordance with New Mexico Department of Transportation's (NMDOT) *Location Study Procedures, A Guidebook for Alignment and Corridor Studies*, also referred to as the "Guidebook" in this document (NMDOT 2000). From the beginning of the project development process, important and sensitive cultural, social, and environmental resources should be avoided to the maximum extent feasible. Physical features that present engineering constraints (e.g., unstable soils) should also be avoided. This requires that the physical, natural, social and cultural conditions present within the study area be identified and assessed so that sensitive and problem areas are recognized early in the process and considered as alternatives are being developed.

The following assessment of existing conditions involved two steps: (1) inventorying the study area's existing natural, cultural, social, and physical features; and (2) evaluating these features to determine which, if any, could limit the location and/or type of transportation improvements that may be needed. Information used for this assessment was developed from existing data sources and from field reviews.

Resource Inventory and Evaluation

This profile presents inventory and evaluation of the following study-area existing conditions:

Natural or Environmental

- Floodplains
- Wetlands and Riparian Habitat
- Vegetation
- Fish and Wildlife, including Special-status Species
- Visual and Scenic resources
- Air Quality
- Noise and Vibration



Cultural resources in the Glorieta Unit of Pecos National Historical Park

Cultural

- Historic Resources
- Archaeological Resources
- Cultural Landscapes
- Section 4(f) Properties

Social

- Social and Economic Conditions
- Community Cohesion
- Environmental Justice
- Public Services and Utilities

Physical

- Soils
- Seismicity and Earthquake Hazards
- Surface Water and Groundwater
- Water Quality

Transportation

- Existing Transportation System/Highway
- Traffic and Safety Information
- Access and Easement Information

Natural Features

Floodplains

Characteristics

The Federal Emergency Management Agency (FEMA) has mapped the major drainages within the Pecos NHP boundaries for determination of flood insurance rates. The 100-year flood boundaries for the Pecos River, Glorieta Creek, and Galisteo Creek within the park are narrow, generally averaging about 500 feet or less in width, but no base flood elevations were determined by FEMA (NPS 1995a). All existing park buildings are on terraces well above the floodplains (NPS 1999).

Glorieta Creek crosses Pecos NHP in two locations. An approximate one-mile section of the creek is contained within the Glorieta Unit (Pigeons Ranch) and the lower 3.5-mile reach of the creek is located within the Pecos Unit. The study area includes the former section in Glorieta Unit.

Floodplains have also been mapped outside NPS jurisdiction in the area immediately east of the Glorieta Unit. One large floodplain area (approximately 2,250 feet in length) is mapped between the frontage road and I-25. A second large floodplain area is located south of Glorieta Creek approximately 3,000 feet east of the Glorieta Unit's eastern border (New Mexico Resource Geographic Information System Program 2005).

The arroyos and creeks adjacent to Glorieta Creek are predominantly dry for most of the year; however, reports have documented water surges in Glorieta Creek and in the arroyos (FHWA 1996). For example, on August 13, 1993, the park received 2.22 inches of precipitation within a three and one-half hour period, producing flash flood conditions for Glorieta Creek.

Sensitivity to Impacts and Potential Constraints

Transportation improvements could potentially displace floodplain capacity through placement of fill related to construction of roadways, structures, and berms. Executive Order 11988 regarding floodplain management requires that any potential impacts to

floodplain areas be assessed to reduce the risk of floodplain capacity, minimize the impact of floods, and preserve both ecological and cultural values served by floodplains. Project planning will need to ensure that the construction design is compatible with the floodplain areas (SMA 2004).

Wetlands and Riparian Habitat

Characteristics

Wetlands are lowland areas that are inundated or saturated with water for a sufficient length of time to allow a prevalence of hydrophytic vegetation. Jurisdictional wetlands, those protected from unauthorized dredge-and-fill activities under Section 404 of the Clean Water Act (CWA) and Executive Order 11990, have three essential characteristics (SMA 2004):

- hydrophytic vegetation, which requires inundation or soil saturation for its existence;
- hydric soils, which are ponded or flooded for a sufficient time during the growing season to develop anaerobic conditions; and
- wetland hydrology, which is the availability of sufficient surface water or groundwater to create the wetland environment.

Riparian and wetland communities occur along Glorieta Creek in the Pigeons Ranch area. Limited information is available regarding the extent, condition, and significance of these resources. Cottonwoods, boxelder, and willows dominate the riparian plant community along this creek (NPS 1995c). These areas support the most diverse vegetation and animal populations in the park and are more susceptible to human disturbance (NPS 1999) (see Vegetation Resources section of this report for more information on riparian plant communities). It is anticipated that there are similar riparian and wetland communities along that portion of Glorieta Creek outside of NPS jurisdiction, east of the Glorieta Unit, but these communities have not yet been mapped, and their condition is unknown at this time.



Interpretive tour of the Glorieta Unit of Pecos National Historical Park

Sensitivity to Impacts and Potential Constraints

The riparian and wetland areas along Glorieta Creek are integral to the overall health of the Pecos River Valley. These areas provide important habitat for wildlife and are a significant part of the cultural landscape. Construction activities associated with transportation improvements could result in the potential loss of wetland vegetation and related habitat. A formal determination of the presence and location of wetlands will be made as the project proceeds.

The local public and park visitors have also expressed strong desires to access riparian and wetland areas for fishing and other recreation activities. Increased visitor use in the Glorieta Unit associated with future road construction could indirectly have an impact on these areas (e.g., trampled vegetation, stream-bank erosion, littering) (NPS 1995b).

Vegetation Resources

Plant Communities

Characteristics

NPS (1995b) identifies four major plant communities within Pecos NHP. These include pinon-juniper woodland, mixed conifer forest, grassland-shortgrass prairie, and riparian wetland. Based on a review of aerial photos, the pinon-juniper and grassland communities are the dominant plant associations in the study area. However, the riparian community

along Glorieta Creek is probably the priority community in terms of assessing potential impacts. A botanical survey of the park documented 354 plant species (NPS 1995b).

The pinon-juniper woodland is characterized by an open canopy, sparse understory, and short tree height (FHWA 1996). Much of the vegetation in the study area has been altered by past and present human activities, including fire suppression, livestock grazing, development, and road construction. Based on a review of aerial photos, approximately 30 percent of the area (primarily west of Joya del Padre Road) between the Glorieta Unit and the Pecos River is developed. As a result, weedy species such as mullein (*Verbascum thapsus*), sweetclover (*Melilotus officinalis*), switchgrass (*Panicum virgatum*), alfalfa (*Medicago sativa*), and Scotch thistle (*Onopordum acanthium*) have become common. Indeed, the prevalence of the pinon-juniper forest itself is largely due to fire suppression and destruction of soils through grazing (NPS 1995b).

The riparian community is composed of a mosaic of riparian and wetland plant communities, including small cottonwood woodlands, willow communities, marshes, and wet meadows. Species commonly occurring in the riparian association include cottonwood (*Populus sargentii*), coyote willow (*Salix exigua*), cattail (*Typha latifolia*), threesquare (*Scirpus americanus*), and baltic rush (*Juncus balticus*) (FHWA 1996).

Sensitivity to Impacts and Potential Constraints

The most significant potential impacts to vegetation caused by road realignment would be to wetland and riparian plant communities. These communities are presently threatened in the Interior West, because they withstand less disturbance and provide habitat for more species than do either pinon-juniper or grassland habitats.

Threatened and Endangered Plant Species

Characteristics

Currently, only two plant species listed on the New Mexico Natural Heritage Program's Rare Plant Database are listed as threatened or endangered at

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

the state or federal level in Santa Fe or San Miguel counties:

- Holy Ghost ipomopsis (*Ipomopsis sancti-spiritus*)
- Santa Fe cholla (*Opuntia viridiflora*)

Currently, the Holy Ghost ipomopsis is only known to exist in a single location along a road to a campground about eight miles north of the study area. The Santa Fe cholla is only known from two localities, the closest being Fort Marcy Park in Santa Fe, New Mexico, approximately 20 miles west of the study area.

Sensitivity to Impacts and Potential Constraints

Given the rarity of these plants and their limited distribution in relatively rare habitats, it is extremely unlikely that they would be encountered. Of these two species, only the Santa Fe cholla may potentially occur in the study area.

Fish and Wildlife Resources and Special Status Species

Fish

Characteristics

Glorieta Creek originates in the mountains of the Santa Fe National Forest and parallels NM 50 in the Pigeons Ranch Subunit (FHWA 1996). It continues east of Pigeons Ranch, outside NPS jurisdiction, for roughly six and one-half miles until it flows into the Pecos River. Stream flow is supported by snowmelt runoff during the spring and early summer, rainfall events throughout the remainder of the year, and wastewater effluent discharge from the Glorieta Baptist Conference Center (FHWA 1996). No flow data are recorded or are available for Glorieta Creek; however, NPS (1995c) reports that summer flows are essentially stagnant. The New Mexico Department of Fish and Game reports populations of brown trout, white sucker, Rio Grande chub, longnose dace, and flathead minnow in the Glorieta drainage (FHWA 1996). These fish are more likely to be present in the lower reaches of Glorieta Creek, where higher groundwater levels support a higher flow.

Sensitivity to Impacts and Potential Constraints

Constructing a new road or improving existing segments of the highway could cause temporary erosion and sedimentation into Glorieta Creek and could cause minor downstream impacts to fish resources in the Pecos River. Increases in impervious area and runoff from newly developed areas could also affect these resources. Any new road option to connect NM 50 to I-25 east of the Glorieta Unit would create a new crossing of Glorieta Creek. This new stream crossing would eliminate some riparian vegetation and, thus, decrease important shade on the creek until replacement vegetation matures.

Wildlife

Characteristics

The most recent inventory of wildlife species in Pecos NHP documented 24 mammals, seven reptiles, two amphibians, and 189 arthropods (NPS 1999). A 1989 bird inventory by a University of Arizona graduate student found 109 bird species, of which 24 were resident and 68 were summer migrants (Mukai 1989). This same study identified 51 potential breeding species in the park. The Pecos River and Glorieta Creek provide the most important wildlife habitat in the park, particularly for birds. A turkey vulture's evening roost is located along Glorieta Creek in a grove of cottonwoods approximately 100 feet east of the La Cueva Road intersection with NM 50 (FHWA 1996).

The most common small mammals in the park include cottontail rabbit, black-tailed jackrabbit, Colorado chipmunk, western harvest mouse, and Mexican woodrat. Larger mammals that have been documented in the park include black bear, mountain lion, mule deer, elk, raccoon, gray fox, beaver, muskrat, and bobcat. Similar types of mammals are likely found in the areas outside NPS jurisdiction between Glorieta Unit and the Village of Pecos.

Sensitivity to Impacts and Potential Constraints

Depending on the location of realignment, NM 50 outside Glorieta Unit could have some beneficial effects for wildlife in the park by removing road traffic in Pigeons Ranch, reducing auto emissions and noise, and reducing impervious surface. However, human activity could increase with the improvement

in interpretive recreation. Also, wildlife would avoid areas of new road construction. Any transportation improvements that may result in higher traveled speeds and higher traffic volumes could increase the likelihood of wildlife-vehicle accidents. The current level of wildlife crossing within the existing portion of NM 50 in this area is relatively unknown (see Connectivity section in subsequent text).

Threatened and Endangered Wildlife Species

Characteristics

No federal or state threatened or endangered species have been documented in the study area. No federally proposed or designated critical habitat areas are located in the study area. The closest is Unit SRM-NM-5a for the Mexican spotted owl, which is located approximately six miles north of Glorieta Pass in the Santa Fe National Forest. Table 1 lists the fish and wildlife species with state or federal status that are listed for San Miguel and Santa Fe counties.

Most of the species listed in Table 1 have not been observed in the study area. Extensive surveys for the southwestern willow flycatcher in the early 1990s failed to locate any of these birds in the Pecos NHP, although a nesting pair was recorded approximately five miles upstream (NPS 1999). The general consensus is that good habitat is present in the study area for these birds and that as the riparian vegetation matures, they will be more likely to inhabit the area. Similarly, several of the other birds on the list are potentially present in the study area as transients or summer migrants, including hummingbirds, yellow-billed cuckoo, bald eagle, peregrine falcon, Baird's sparrow, gray vireo, and black tern. Several other species listed in the table would only occur at the higher elevations of the Sangre de Cristo Mountains north of the study area. These include American marten, white-tailed ptarmigan, Mexican spotted owl, and boreal owl. No black-footed ferrets have been reintroduced anywhere near the study area because of the lack of suitable prairie dog colonies. Northern goshawk, Pecos River muskrat, and gray vireo have all been documented in the Pecos NHP vicinity (NPS 1999).

Sensitivity to Impacts and Potential Constraints

No adverse effects are expected for any state or federal threatened and endangered species because no such species are known to occur in the study area. Other species with state or federal status that occur in the study area may be temporarily disturbed by construction activities. Adverse impacts to riparian vegetation along Glorieta Creek could remove potential habitat for southwestern willow flycatcher and possibly yellow-billed cuckoo.

Connectivity

Characteristics

The University of New Mexico and New Mexico Department of Transportation maintain a statewide database of animal-related vehicle crashes on state and federal highways. A query of this database revealed that there have been 14 animal-related crashes between 1999 and 2003 in the Pecos area. Eleven of these crashes were with deer or bear; of these, nine took place between mileposts 299 and 313 on I-25.

The New Mexico Department of Game and Fish has identified I-25 between Glorieta Pass and Las Vegas as a high risk area for animal-vehicle crashes. This is probably due in part to the movement of wildlife, particularly large animals such as black bear, between the Sangre de Cristo Mountains and the Glorieta Mesa. It is probably also due to the barrier effect of the I-25 transportation corridor, which comprises a four-lane freeway, two two-lane state roads, and an active railroad. This combination of transportation routes creates a significant mortality risk for large and small animals attempting to travel through the area. The Pecos River – as one of only five year-round, free-flowing rivers in New Mexico – is also an important wildlife corridor. It crosses I-25 approximately 17 miles east of the study area. Glorieta Creek and the Pecos River are the most important wildlife habitats in the Pecos NHP, and they provide some of the best cover for animals moving through the area.

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

Table 1 - Federal and State-Listed Threatened and Endangered Species in Santa Fe and San Miguel Counties

Common Name	Scientific Name	Status ¹
American marten	<i>Martes americana origenes</i>	ST
American peregrine falcon	<i>Falco peregrinus anatum</i>	ST, SOC
Baird's sparrow	<i>Ammodramus bairdii</i>	ST, SOC
Bald eagle	<i>Haliaeetus leucocephalus</i>	FT, ST
Black tern	<i>Chlidonias niger surinamensis</i>	SOC
Black-footed ferret	<i>Mustela nigripes</i>	FE, EXPN
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	C
Boreal owl	<i>Aegolius funereus</i>	ST
Broad-billed hummingbird	<i>Cynanthus latirostris magicus</i>	ST
Brown pelican	<i>Pelecanus occidentalis carolinensis</i>	SE, FE
Burrowing owl	<i>Athene cunicularia hypugaea</i>	SOC
Common black hawk	<i>Buteogallus anthracinus anthracinus</i>	ST, SOC
Gray vireo	<i>Vireo vicinior</i>	ST
Least shrew	<i>Cryptotis parva</i>	ST
Mexican spotted owl	<i>Strix occidentalis lucida</i>	FT
Mountain plover	<i>Charadrius montanus</i>	PFT
Northern goshawk	<i>Accipiter gentilis</i>	SOC
Pale Townsend's big-eared bat	<i>Plecotus townsendii pallescens</i>	SOC
Pecos River muskrat	<i>Ondatra zibethicus ripensis</i>	SOC
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	FE, SE
Swift fox	<i>Vulpes velox velox</i>	SOC
White-eared hummingbird	<i>Hylocharis leucotis borealis</i>	ST
White-tailed ptarmigan	<i>Lagopus leucurus altipetens</i>	SE
Whooping crane	<i>Grus americana</i>	FE, EXPN, SE
Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	C
Arkansas River shiner	<i>Notropis girardi</i>	FT, SE
Rio Grande silvery minnow	<i>Hybognathus amarus</i>	FE
Suckermouth minnow	<i>Phenacobius mirabilis</i>	ST

¹ Status definitions: FE = federal endangered; SE = state endangered; FT = federal threatened; ST = state threatened; SOC = federal species of concern; C = federal candidate for listing; EXPN = experimental, nonessential (population) P = proposed.

Sensitivity Impacts and Potential Constraints

Decommissioning and/or realigning existing segments of NM 50 could remove or change a potential barrier to animal movement through Pigeons Ranch and might decrease the risk of animal-vehicle collisions in this area. However, this improvement might be offset by the construction of a new connection between NM 50 and I-25.

Visual and Scenic Resources

Characteristics

Pecos NHP was established in part because of its scenic resources (NPH 1995a). The views at the park are dominated by the surrounding mountains, which provide dramatic topographic relief and visual contrast with the nearby mesas, rolling valley terrain, and wooded river valleys. Although a few developments and structures can be viewed from within the park, the Pecos River Valley has largely retained its visual integrity (NPS 1999).



A view of the Pecos valley

The Glorieta Unit of the park has several major visual intrusions. For example, several residences and commercial structures are visible along NM 50, which traverses the entire Pigeons Ranch area (NPS 1995a). The area between the Glorieta Unit boundary and Village of Pecos is characterized by rolling meadows and some steeper inclines (FHWA 1996).

The near, short-range views into the park from NM 50 and I-25 are limited along the majority of these routes because of moderate-to-dense forest cover. Views are more open and distant at the arroyos and at higher elevations.

Sky glow is an increasing concern in national parks and other natural areas. The most common source of sky glow is light from nearby urban development.

Sensitivity to Impacts and Potential Constraints

Construction activities associated with a new roadway or improvements to the existing roadway would disturb the natural environment and in some cases, could require cuts and fills that might adversely affect the visual character of the surrounding area. If a new road is located outside park boundaries, it would most likely be located in an undeveloped or underdeveloped landscape, but the physical and visual impact of the roadway could adversely affect residents living nearby. There are dozens of small structures in the area south of NM 50 and north of I-25 between the Glorieta Unit and Village of Pecos that will need to be taken into consideration while planning alternative routes. In addition, depending on their specific locations, alternative routes within National Park Service boundaries could affect the visual integrity and inherent cultural landscape character and quality of important park resources such as the Glorieta Battlefield.

Increased vehicle traffic along a new roadway also represents a source of artificial light that could visually degrade the study area. Any increase in artificial lighting either within or outside the park boundaries may generate sky glow and disrupt viewing of the night sky.

Air Quality

Regional Conditions

Characteristics

The significance and integrity of many park resources depend on good air quality. Air quality and visibility at the park is usually excellent, offering clear views of the Sangre de Cristo Mountains (NPS 1995a).

Sensitivity to Impacts and Potential Constraints

Air quality in the regional airshed is rated as better than required by the primary or secondary national ambient air quality standards. However, air inversions in the winter occasionally trap smoke from wood-burning stoves, resulting in a haze that hangs over the upper Pecos River Valley from Rowe to Pecos (NPS 1999).

Local Conditions

Characteristics

The Federal Clean Air Act of 1970 and its amendments established National Ambient Air Quality Standards (NAAQS) to protect the public from harmful levels of common pollutants in ambient air. The NAAQS establish maximum allowable concentrations for six major air pollutants: carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), lead (Pb) and particulate matter (PM). The study area extends into the Upper Rio Grande Valley Intrastate Air Quality Control Region (AQCR) No. 157 and the Northeastern Plains Intrastate AQCR No. 154 (New Mexico Environment Department, Air Quality Bureau Website 2004). As of 2005, this area was in attainment of all NAAQS (Trujillo, pers. comm. 2005).

No major stationary or mobile sources of air pollutants occur within or adjacent to the study area. Existing traffic volumes on NM 50 and adjacent

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

roadways are insufficient to generate substantial concentrations of mobile-source pollutants. Because of the area's generally low development levels and the lack of major emission sources, high pollutant concentrations do not occur in the study area.

Under the provisions of the Clean Air Act of 1977, the park is designated as a Class II clean air area. Under this designation, limited development can be permitted near the park as long as levels of particulate matter, sulfur dioxide, and nitrogen dioxide do not exceed class II increments (maximum allowable increases) (NPS 1999).

Sensitivity to Impacts and Potential Constraints

Localized impacts at Pigeons Ranch or in other areas where improvements might occur could result from dust and equipment exhaust during construction activities. Motor vehicle emissions would increase with increased vehicle traffic; emissions would increase further when vehicles are idling while queued in traffic at entrances or in parking areas.

Noise and Vibration

Noise

Characteristics

A descriptor for environmental noise is the equivalent sound level (L_{eq}). L_{eq} is defined as a sum of energy-averaged discrete samples of noise over a specific period of time. It is a measure of total noise, a summation of all sounds during a time period (usually one hour). As such, more emphasis is placed on occasional high noise levels than accompanying general background noise levels.

Background noise from automobile and truck traffic on I-25 and NM 63 and trains on the Burlington Northern–Santa Fe railway are audible throughout most of the park. Noise from vehicle traffic is also audible in the Pigeons Ranch area in the Glorieta Unit along NM 50 (NPS 1999).

Noise levels have not been measured in the park. However, the FHWA highway traffic noise model STAMINA 2.0/OPTIMA was used to model existing peak-hour traffic-noise levels in the NM 50 corridor

in 1993. Modeling results showed existing peak-hour modeled noise levels ranged from 45 to 74 dBA L_{eq} at the modeled receiver locations (FHWA 1996).

Sensitivity to Impacts and Potential Constraints

Auto, truck, and rail traffic are part of the ambient noise environment in most portions of Pecos NHP and in the park's vicinity. Depending on the location of alternative alignment(s), the sounds of additional motor vehicle traffic and construction equipment associated with possible road relocation activities could greatly diminish the tranquility of a visit to the park, particularly to those areas of the park that showcase its natural features. Construction noise is typically associated with earth removal, hauling, grading, and paving. Further analysis will be required to determine if alternative roadway alignments outside the park could result in adverse noise effects to other nearby sensitive receptors such as residents living in the area between Glorieta Unit and the Village of Pecos. As described in Visual and Scenic Resources, there are dozens of small structures south of NM 50 and north of I-25 between the Glorieta Unit and Village of Pecos that will need to be taken into consideration while planning alternative routes.

Vibration

Characteristics

Maximum peak particle velocities are a measure for assessing structural vibration damage. Vibration studies in Great Britain, Sweden, and Germany suggest that an upper vibration limit for a one-of-a-kind, historic, adobe-stone structure should be 2 millimeters (mm) per second (mm/sec). Modern unreinforced masonry-adobe structures could, however, have a higher limit—near 6 mm/sec. The U.S. Bureau of Mines recommended limit for reinforced masonry structures is 12 mm/sec (King and King 2002).

Two structures in the study area are located within 10 meters (33 feet) from the edge of NM 50. One structure is not considered a historic building. The second building is the historic Pigeons Ranch structure located 1 meter (3 feet) from the NM 50 right-of-way (FHWA 1996).

A vibration investigation of the Pigeons Ranch structure, conducted in 2002 (King and King), demonstrated that logging trucks traveling on NM 50 generally exceeded the suggested maximum induced vibration amplitude limit of 6 mm/sec, while most other vehicles (i.e., heavy trucks and cars) were below this limit. The investigation concludes that vibrations induced by sedans and small trucks are too low of amplitude and of the wrong frequencies to constitute a high-to-moderate risk to the structure. Larger trucks, however, which induce a lower frequency and higher amplitudes, may pose a moderate risk to the structure.

Sensitivity to Impacts and Potential Constraints

Excess or extreme vibration can cause both structural and superficial damage to buildings and structures. Minor surface damage is generally tolerable in a typical building structure. Historical structures, however, may require preservation from both structural and cosmetic damage (FHWA 1996). Rerouting NM 50 outside the NHP boundary would result in a significant reduction in traffic-induced vibration at the Pigeons Ranch structure. Further analysis will be required to determine if alternative alignments outside the park could result in adverse vibration effects to other nearby structures. However, under the alignments being considered, it appears there would be more than adequate space between the roadway and any structures in the vicinity, so vibration likely would not be an issue.

Cultural Features

Historic Resources

Characteristics

Pecos NHP is listed on the National Register of Historic Places (NPS 1995a). The park preserves 10,000 years of history, including Santa Fe Trail sites and the site of the Civil War Battle of Glorieta Pass.

The Santa Fe Trail, designated as a National Historic Trail in 1987, played a critical role in the westward expansion of the United States, and between 1821 and 1880 it was an important two-way avenue for commerce and cultural exchanges. The current



alignment of NM 50 at Pigeons Ranch moved to this location in 1880. Glorieta Creek occupies portions of the depressions formed by the former trail (FHWA 1996).

The Pecos National Monument was established in 1965 and expanded and renamed Pecos National Historical Park in 1990. In that same year, Congress established Glorieta National Battlefield in Public Law 101-536, adding 682 acres to Pecos National Historical Park. Approximately 5,500 acres of the Forked Lightning Ranch were also included within the park boundaries at this time. In addition to being a National Park Service unit, the Pecos NHP and the Glorieta Battlefield are National Historic Landmarks and are listed on the New Mexico State Register of Cultural Properties.

The Glorieta Battlefield has also been included as one of the 50 most threatened designated National Historic Landmarks in the country (NPS 1999). The majority of the park's resources and landscapes, however, have yet to be evaluated for national register eligibility (NPS 1995a).

The Glorieta Battlefield consists of two discontinuous parcels of land—the Pigeons Ranch Subunit and the Cañoncito Subunit. Both contain sites, features, and landmarks associated with the Civil War Battle of Glorieta Pass.

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

Pigeons Ranch is bounded by Glorieta Creek on the south and steep rocky hillsides on the north. Pigeons Ranch was originally comprised of a number of adobe structures, including a trading post, saloon, corrals, stables, a residence, sheds, and a well. By the turn of the century from the 1800s to the 1900s, however, many of the buildings had fallen into disrepair. Only the trading post located close to NM 50 and the well south of this road remain.

Sensitivity to Impacts and Potential Constraints

The proximity of NM 50 and unstructured visitor use is adversely affecting the Pigeons Ranch trading post building and its setting. Vibrations from traffic along NM 50 are of particular concern to historic structures (see Noise and Vibration in preceding text). Other activities that could have a potential impact on these resources include constructing new facilities that could compromise historic properties and affect site features and context.

Archaeological Resources

Characteristics

Collectively, the park's archeology represents 12,000 years of human history in this part of the Southwest. Eight archeological sites have been recorded within the Pigeon's Ranch subunit including the Glorieta Battlefield, Arrowhead Lodge, and the Pigeon's Ranch (NPS 1995a). The potential for buried archeological deposits and artifacts to yield information about the site that could clarify gaps and inconsistencies in the historical record is an important consideration in reviewing potential alternatives.

To date, limited field studies have been conducted within the Pigeon's Ranch subunit. These studies indicate the possible presence of other archeological sites, but when a portion of NM 50 east of Pigeon's Ranch was widened in the mid-1990's, no artifacts or features were observed (FHWA 1996)

A preliminary investigation of archaeological sites within the park and in the surrounding region was undertaken by downloading data from the New Mexico State Historic Preservation Office (SHPO).

This investigation yielded 539 archaeological sites over an area that extends from Glorieta west to the Pecos Unit and east of NM 63. No determination has been made to date regarding the number of sites within this area eligible for placement on the National Register of Historic Places (NRHP).

Sensitivity to Impacts and Potential Constraints

Archaeological sites are vulnerable to unauthorized collecting, vandalism, development, and trampling. Increased public use of National Park Service lands in the Glorieta Unit (e.g., along newly developed trails and interpretive sites) could affect both known and undiscovered archaeological resources.

Roadway construction would disturb and compact soils, which in turn could alter the horizontal and vertical distribution of buried archaeological remains and damage fragile resources. Based on a preliminary investigation of known archaeological sites recorded at the New Mexico SHPO, it appears that the likelihood of encountering archaeological resources along any given roadway alignment could range from low to high, depending on the final alignment selected and the ability to design the road to avoid known resources. During planning and before final design of any new facilities, including roads and trails, a Section 106 cultural resources assessment would be conducted. Designs would consider the results of the assessment to ensure that significant resources are avoided during construction (NPS 1995a).



Artist illustration of the Civil War era battle at Glorieta

Cultural Landscapes

Characteristics

The cultural landscape as a whole represents the combination and the interrelationship of several factors, including natural, archaeological, structural, ethnographic, and landscape resources and values. A cultural landscape is the largest area within a park unit that is eligible for the NRHP, and component landscapes are contributing or eligible parts of this landscape.

The whole of the Pigeons Ranch Subunit in the Glorieta Unit of Pecos NHP makes up a component landscape. This component landscape is nationally significant under National Register Criterion A for its association with the Battle of Glorieta Pass and significant under Criterion D because of the presence of prehistoric and historic resources (NPS 1998).

Sensitivity to Impacts and Potential Constraints

This cultural and historic landscape is affected by the presence and intrusion of traffic and other modern features in the surrounding area that can compromise the setting, feeling, and association of the historic landscape. Activities that remove automobile and truck traffic from within the Pigeons Ranch Subunit would benefit this landscape component by preserving the location and integrity of major elements associated with the Glorieta Battlefield (e.g., major circulation corridor, remnants of Pigeons Ranch complex).

Section 4(f) Properties

Regulations

Protection of certain public lands and all historic sites was originally mandated in Section 4(f) of the 1966 Department of Transportation Act (49 United States Code [USC] 303). Section 4(f) declares a national policy to preserve, where possible, “the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.”

Section 4(f) applies to all historic sites, but only to publicly owned parks, recreation areas, and wildlife

and waterfowl areas. Section 4(f) does not apply when parks, recreation areas, and wildlife and waterfowl refuges are privately owned, even if such areas are open to the public. Furthermore, for Section 4(f) purposes, a historic site is significant only if it is on or eligible for the NRHP.

Use of Section 4(f) land is not limited to property acquisitions. Federal Highway Administration (FHWA) rules require that a Section 4(f) evaluation be conducted even if the project does not actually intrude into a protected use. A Section 4(f) evaluation needs to occur when a project’s impacts are in the proximity of protected areas and are so severe that the resources’ activities, features, or attributes are substantially affected. Such impacts are referred to as “constructive use” of Section 4(f) land.

Characteristics

There are no wildlife refuges in the study area, but there are several historic sites, public parks, and recreation areas.

The whole of Pecos NHP is a public park and recreation area as well as an historic site, listed on the NRHP. Specific recreation activities allowed inside park boundaries include hiking, bird watching, and stargazing (National Park Service Website 2005).

The Pecos–Las Vegas Ranger District of the Santa Fe National Forest, managed by the USDA Forest Service, surrounds the Glorieta Unit of Pecos NHP. The Forest Service provides a variety of outdoor recreation opportunities in this forest such as: hiking, hunting, backpacking, fishing, camping, and horseback riding (NPS 1995a).

Sensitivity to Impacts and Potential Constraints

Any roadway construction activity within NHP boundaries would constitute a “use” of both a historic site and a public park property. Depending on the specific location, rerouting NM 50 outside the NHP boundary could also result in “use” or “constructive use” of park and recreation property in the Santa Fe National Forest.

Under Section 4(f), FHWA and other US Department

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

of Transportation agencies can only approve the use of these types of lands if no feasible and prudent alternative exists and if the sponsoring agency demonstrates that all possible planning to minimize harm has been accomplished. Supporting information must demonstrate that unique problems exist or unusual factors are involved in the use of alternatives that avoid these properties or that the cost, social, economic, and environmental impacts or community disruption resulting from such alternatives reach extraordinary magnitude.

Social Features

Social and Economic Conditions

Characteristics

The Glorieta and Pecos areas are primarily rural and serve as “bedroom communities” for Santa Fe.

Except for within the Village of Pecos, the residences are widely dispersed. Opportunities for employment exist in the local area. Small-scale commercial and industrial establishments are located in the Village of Pecos or in the unincorporated Glorieta area; however, a high percentage of residents commute to jobs in the greater Santa Fe area. The Glorieta postmaster has indicated that there has been a substantial increase in customer service over the last several years. This is an indicator that growth is occurring in the area.

US Census

U.S. Census 2000 demographic information for local census areas was examined and compared to county and statewide demographics to describe the social and economic characteristics of the study area. Table 2 describes selected population, housing, and employment information for the state, counties,

Table 2 - Selected Population, Housing, and Employment Information

Area	Percentage of Housing Owner-Occupied	Percentage Same House Last Five Years	Percentage 16 Years and Older in Labor Force	Percentage Labor Force Unemployed	Mean Travel Time to Work in Minutes
State of New Mexico	70.0	54.4	61.0	4.4	21.9
Local Jurisdictions and Places ¹					
Santa Fe County	68.6	53.4	66.9	3.1	22.1
San Miguel County	73.1	63.2	54.6	4.8	23.6
Pecos Village	73.2	64.4	69.2	3.5	28.5
Glorieta CDP ¹	83.2	65.8	72.0	5.1	28.2
Study Area Census Tracts					
Census Tract 103.06	87.1	55.7	66.1	2.9	37.3
Census Tract 108	82.1	68.6	74.3	3.3	27.9
Census Tract 9576	82.0	63.8	59.8	4.3	30.1
Census Tract 9577	88.7	75.6	54.1	4.6	46.5
Study Area Census Block Groups (BGs)					
Census Tract 103.06 BG 1	86.8	64.4	N/A	N/A	30.0
Census Tract 108 BG 1	84.7	69.5	N/A	N/A	35.7
Census Tract 9576 BG 2	81.2	60.0	N/A	N/A	28.0
Census Tract 9576 BG 3	81.4	50.9	N/A	N/A	29.2
Census Tract 9577 BG 1	83.7	50.0	N/A	N/A	35.5

¹ CDP is the abbreviation for a Census Bureau–designated place, a statistical entity defined for each decennial census according to Census Bureau that makes up a densely settled concentration of population that is not within an incorporated place, but that is locally identified by name. CDPs are delineated cooperatively by state and local officials and the Census Bureau, following Census Bureau guidelines. Beginning with Census 2000, there are no size limits to a CDP.

Source: US Census 2000

N/A—data not available at block group level.

places, and local census areas in which the study area lies.

Local census tracts and places have substantially higher home-ownership rates compared to the state and counties overall. With the exception of Pecos Village, which is comparable to the state and counties, at least 82 percent of housing units in the local census areas are owner-occupied. In addition, residents in the local area tend to stay in their houses longer compared to those in the state and Santa Fe County. With the exception of those in Census Tract 103.06, at least 63 percent of residents in local areas resided in their house for at least five years at the time of the census, compared to approximately 54 percent in the state and Santa Fe County. Length of residency in San Miguel County was comparable to the local area. These statistics support the perception that residents in the area have long-term ties to the land, with many local families having lived in the area and on the same parcels of land for many generations (see the Environmental Justice section).

Santa Fe County and census areas within the county (Glorieta and Census Tracts 103.06 and 108) tended to have higher percentages of the population in the work force compared to San Miguel County and its census areas (Pecos Village and Census Tracts 9576 and 9577). Pecos Village, however, was the exception, with a percentage of the population in the work force more similar to Santa Fe County. Unemployment rates tended to be lower in Santa Fe County than in San Miguel County, with the exceptions of the Glorieta and Pecos Village areas. Glorieta, in Santa Fe County, had a relatively high unemployment rate (5.1 percent), while Pecos Village, in San Miguel County, had a relatively low unemployment rate (3.5 percent).

Local resident commute times reflect the study area's status as a bedroom community for the greater Santa Fe area. Residents in the study area had much longer commutes to work compared to the state and the counties as a whole. On average, local residents had commutes of at least 28 minutes and up to 46 minutes, while the state's average commute time was approximately 22 minutes.

US Census 2000 population numbers were reviewed at the block level for the area between the Glorieta and Pecos units, south of SR 50 and north of I-25, the general area in which realignment of SR 50 would occur. In 2000, approximately 800 people lived in this area of approximately seven square miles, a density of approximately 114 people per square mile (about one person for every 5.6 acres).

County Plans

The Santa Fe County Growth Management Plan (referred to here as the Santa Fe County Plan) (1999) and the San Miguel County Comprehensive Plan (referred to here as the San Miguel County Plan) (2004) were reviewed to augment the census information.

According to the Santa Fe County Plan, the county population grew by just more than 25 percent between 1990 and 2000, with the central portion of the county, which encompasses the study area, growing at a rate of approximately 23 percent. The Santa Fe County Plan predicted that the county's population would grow by close to 26 percent between 2000 and 2020, from 124,045 people in 2000 to 156,140 in 2020. The central portion of the county is predicted to grow by approximately 24 percent in that same period, from 100,972 people in 2000 to 125,680 in 2020. The county as a whole would need 25,297 new housing units within the 20-year time frame to accommodate the population growth, with 19,192 units required in the central portion of the county.

According to the San Miguel County Plan, the county's population grew a total of 20 percent between 1990 and 2000, with the Village of Pecos growing at a much greater rate of 42.4 percent. The county population is expected to continue to grow in the coming decades but at a slower rate. The San Miguel County Plan cites US Census Bureau population projections, which predict that the county population will grow by approximately 11 percent between 2000 and 2020, from 30,126 people in 2000 to 33,398 in 2020. Based on the plan's population predictions, the county would need approximately 1,350 new housing units to accommodate the population growth.

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

Sensitivity to Impacts and Potential Constraints

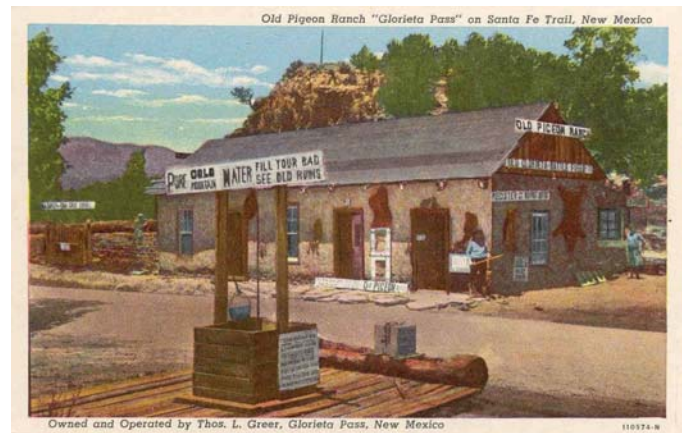
The study area appears to be in transition from a primarily rural community to a community with a mix of long-time residents and relatively new residents, who work in the greater Santa Fe area. Some residents have strong ties to the land and may be more sensitive than others to roadway alternatives that could adversely affect the traditional character of the area. Potential growth-inducing effects of roadway realignment could be an area of concern. Other residents could be more concerned with how roadway alternatives affect their commute to work. The social and economic conditions analysis will need to evaluate project impacts on these potentially conflicting local interests.

Community Cohesion

Characteristics

This description of community cohesion in the Glorieta-Pecos area is based on the approach used in the *Glorieta Pass Environmental Data Investigation Report* (FHWA 1996). The immediate Glorieta-Pecos area includes the Village of Pecos, East Pecos, Glorieta, East Glorieta, and scattered enclaves and residences, which encompass parts of both Santa Fe and San Miguel counties. Such political boundaries or general trade areas can be used to define rural community limits; however, these boundaries do not always coincide with individual loyalties and interaction patterns¹ (FHWA 1996: pp. 3-14). Retail trade areas in rural regions may be larger than a resident's community of identification (i.e., shared perceptions about or toward a particular identifiable area). For rural residents, modern transportation has substantially lengthened distances for affiliations related to retail centers, churches, employment, and schools. Because of the uncertainty in determining community boundaries, a wide variety of characteristics need to be examined, including population characteristics, community organizations, and public services.

Many residents in the Glorieta-Pecos area have a high



Historic postcard depicting Pigeons Ranch

level of place association (i.e., personal identification with a particular identifiable locale). A number of the residents descend from families that were the original land grantees and that have lived in the Glorieta-Pecos area for many generations. The area's location along the Santa Fe Trail contributes to this longevity of association with the land. Many of the first settlers were immigrants from Spain, who traveled along the trail, acquired land, and established families that remain today.

Although residents generally have bonds or ties to many of the area's established places, the level of association varies widely among local residents. Places of employment, school facilities, and churches are often in locations different from that of an individual's residence. A portion of the population that has moved into the area in recent years works in Santa Fe, which establishes a greater association with the larger community. Also, Santa Fe and San Miguel counties allow children living near the county line to choose which school system they will attend; this reflects the variety of the employment, shopping, and population patterns in the community.

The most effective way to spread information in the community appears to be through the churches because there do not seem to be other vehicles of communications to all residential enclaves and population groups in the area. The Catholic mission church in the Glorieta area and St. Anthony's Catholic Church in Pecos draw members from the surrounding

¹ Interaction patterns are common behavior patterns that are manifested through daily social interaction, the use of local facilities, and participation in local organizations.

area. Other churches in the area include the Glorieta Baptist Church and the Church of Christ in Pecos.

Few public services are available in the Glorieta-Pecos area. The only health-care facility in the area is a small clinic in the Village of Pecos. Other medical services must come from Santa Fe. Fire protection, including emergency medical services, is provided by the San Miguel County Volunteer Fire Districts and the Santa Fe County Fire Districts (see Public Services and Utilities).

Sensitivity to Impacts and Potential Constraints

Glorieta-Pecos area residents have a wide variety of association with local places depending on where they live, work, shop, attend school, or attend church. These residents, however, share a high level of place association to rural Santa Fe and San Miguel counties and to the area's Spanish and Hispanic origin and culture. Glorieta-Pecos residents may, therefore, be relatively sensitive to the impacts to traditional land holdings or residential compounds that could come from roadway widening or realignment impacts or to changes to the existing character of the area.

Environmental Justice

Regulations

Executive Order 12898 on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994) requires federal agencies to take appropriate steps to identify and address disproportionately high and adverse effects of federal activities on the health or environment of minority and low-income populations. This executive order is supported by Title VI of the Civil Rights Act of 1964, which requires the federal government to consider the impact of its actions on minority populations. The intent of this executive order is to promote nondiscrimination in federal programs that may substantially affect human health and the environment and to provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment.

Characteristics

US Census 2000 information was reviewed to better understand the demographic composition of the Glorieta-Pecos area. The purpose of this evaluation was to estimate the proportion of the population considered minority, as well as the proportion considered to be low-income. Table 3 summarizes relevant race and ethnicity, and poverty level census data for the local jurisdictions and places, study area census tracts, and census block groups.

The City of Santa Fe and surrounding area is known as the Spanish or Hispanic center of the Southwest, which is a unique and defining community characteristic. As the census information demonstrates, a high percentage of people living in the Glorieta-Pecos area are of Spanish and Hispanic origin, particularly in Pecos Village (80 percent) and the surrounding San Miguel County census tracts (74 percent to 83 percent). High proportions of people of Spanish and Hispanic origin reside in the surrounding areas as well. The populations of San Miguel and Santa Fe counties are 78 percent and 49 percent Hispanic, respectively.

The region and the study area have high proportions of individuals living at less than the poverty level. Overall, a smaller proportion of Santa Fe County's population lives at less than the poverty level (12 percent) compared to that of San Miguel County's population (24 percent). This trend holds true near the study area, with a smaller proportion of people in surrounding Santa Fe County census tracts (Census Tracts 103.6 and 108) at less than the poverty level compared to the San Miguel County census tracts (Census Tracts 9576 and 9577). In the Village of Pecos, 16 percent of the population is living at less than the poverty level, a lower proportion compared to San Miguel County overall.

Sensitivity to Impacts and Potential Constraints

Considering the high proportion of minority and low-income populations in the study area, it will be important for future environmental analysis to fully evaluate and address the potential for adverse impacts on individuals and communities protected by Executive Order 12898. All reasonably foreseeable

Table 3 - 2000 Census Data

Area	Population	Percentage Non-White ¹	Percentage Hispanic ¹	Percentage Individuals under Poverty Level ²
Santa Fe County	129,292	26.5%	49.0%	12.0%
San Miguel County	30,126	43.8%	78.0%	24.4%
Pecos Village	1,441	31.1%	80.1%	15.9%
Glorieta CDP ⁵	859	21.9%	56.0%	16.4%
Census Tract 103.06	10,755	14.6%	21.9%	7.3%
Census Tract 108	2,912	21.3%	39.2%	8.8%
Census Tract 9576	6,153	36.3%	74.4%	18.3%
Census Tract 9577	2,297	57.2%	83.4%	19.9%
Census Tract 103.06 BG 1	1,062	21.5%	34.3%	N/A
Census Tract 108 BG 1	830	19.5%	53.1%	N/A
Census Tract 9576 BG 2	1,935	38.0%	68.3%	N/A
Census Tract 9576 BG 3	2,039	32.0%	81.0%	N/A
Census Tract 9577 BG 1	1,271	57.7%	80.0%	N/A

Source: US Census 2000

N/A—Data not available at block group level.

¹ Individuals can identify themselves as being of more than one race and Hispanic people can be of any race.

² The Census Bureau uses the federal government's official poverty definition, which involves comparing an individual's total family income with the poverty threshold appropriate for that individual's family size and composition. Poverty status is determined for all people except those who are institutionalized, in military group quarters, in college, or those who are unrelated and less than 15 years old.

³ Percentage of population five years old and older.

⁴ Respondents who said they spoke English "very well" were considered to have no difficulty with English. Those who indicated they spoke English "well," "not well," or "not at all" were considered to have difficulty with English; they were identified as people who spoke English less than "very well."

⁵ CDP is the abbreviation for a Census Bureau–designated place, a statistical entity defined for each decennial census according to Census Bureau that makes up a densely settled concentration of population that is not within an incorporated place, but that is locally identified by name. CDPs are delineated cooperatively by state and local officials and the Census Bureau, following Census Bureau guidelines. Beginning with Census 2000, there are no size limits to a CDP.

adverse social, economic, and environmental effects on minority populations and low-income populations must be identified and addressed. Possible examples of adverse effects could include noise and water pollution; destruction or disruption of human-made or natural resources; destruction or disruption of community cohesion; vibration; displacement; and increased traffic congestion, isolation, exclusion, or separation of minority or low-incomes individuals within a given community or from a broader community.

Ongoing and future environmental analysis and project planning and design efforts will continue to actively involve local communities, project interests, adjacent property owners and the public-at-large. Ongoing public involvement activities, along with more detailed demographic and geographic analysis, will aide the process of identifying and addressing potential impacts to minority and low income populations and will assist in the development of avoidance, enhancement, or mitigation options.

Also, as part of the ongoing public involvement process, the project team will continue to provide

language interpretation and translation services as requested to engage non-English speaking members of the community. Executive Order 13166 *Improving Access to Services for Persons with Limited English Proficiency* (LEP) (August 11, 2000) should be referenced. This executive order addresses the need to improve access to federally conducted and federally assisted activities for people who, as a result of national origin, are limited in proficiency with the English language. Services could continue to include preparing notices and some project materials in Spanish, providing a Spanish interpreter at public meetings, and publishing notices in local publications.

Land Use Patterns/Consistency with Plans and Policies

Characteristics

The Glorieta Unit of Pecos National Historical Park is located in Santa Fe County, New Mexico. The county classifies the Glorieta Unit as a Cultural Site. The land around the Glorieta Unit is mostly forest, agriculture, and ranch lands. Rural single-family lots are also adjacent to and contained within the Glorieta Unit. The San Miguel County boundary is east of the site. San Miguel County is a rural county characterized by small, traditional villages located along river corridors, large open ranchland, and forested lands under federal protection. Population is concentrated in the city of Las Vegas and the Village of Pecos. Federal and state lands together make up 19 percent of the land area of San Miguel County. The remaining 81 percent is in private ownership (San Miguel County Comprehensive Plan, 2004).

Sensitivity to Impacts and Potential Constraints

The county classifies the Glorieta Unit as a Cultural Site. As such, Santa Fe County requires cultural reports for work completed within the site boundary. Zoning issues would only be a constraint if there were impacts to the cultural resources in the Glorieta Unit. The National Park Service already regulates impacts to cultural sites.

NM 50 is considered a Highway Corridor District. The district consists of all land within 150 feet of the

right-of-way. Certain regulations and standards apply to the area within the district. All structures must be set back 150 feet from the roadway pavement and efforts shall be made to preserve existing vegetation and topographical features. Major development is not proposed, therefore, work within 150 feet of the right-of-way would not be an impact.

If roadway improvements occur within the existing right-of-way, no land use constraints would occur. Santa Fe County Zoning regulates development within the county. The San Miguel Comprehensive Plan guides development in its county. There is a possibility that improving the roadway could spur growth in one or both counties. Santa Fe County's zoning code would regulate where growth can occur. San Miguel encourages reasonable growth and economic benefits to retain the local population. Growth in San Miguel County is encouraged as long as natural, cultural, and historical resources are preserved (Comprehensive Plan, 2004).

As shown in "Social and Economic Conditions" (page 27), San Miguel County and Santa Fe County project an increase in population and new housing units that may increase density in the study area.

Public Services and Utilities

Law Enforcement, Fire Protection and Emergency Services

Characteristics

Law Enforcement

The San Miguel County sheriff's office provides crime prevention in San Miguel County. Staffing includes one sheriff, six deputies, one office manager, and one dispatcher (San Miguel County 2004). The Santa Fe County Sheriff's Department provides crime prevention in Santa Fe County and employs approximately 80 sworn personnel and 15 civilian staff (Lopez, pers. comm. 2055). National Park Service staff provides law enforcement functions on National Park Service property (NPS 1995a).

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

Fire Protection and Emergency Services

The San Miguel County Volunteer Fire Districts provide risk services to the unincorporated areas of San Miguel County. Services include fire suppression, hazardous materials mitigation, emergency medical services (EMS), rural search and rescue, and fire prevention. There are approximately 300 volunteers working in various positions in the departments. Approximately 90 percent of fire calls are in response to wildland fires. EMS units respond to automobile accidents along I-25 within the county and to emergency 911 calls in rural areas of the county. The closest San Miguel County volunteer fire station in the vicinity of NM 63 is Station No. 17, located in Pecos Canyon at 607 South State Road 63 (San Miguel County 2005).

With a drought in northern New Mexico, large wildland fires have occurred in the Pecos vicinity regularly since the year 2000. Additionally, a pine bark beetle infestation has moved into the surrounding forests. As a result, the Pecos Volunteer Fire Department in San Miguel County has been working to improve its capability to address wildland fire, particularly because much of its community is located in a wildland-urban interface. The department needed personal protective equipment and supplies for its wildland fire truck to better protect life, home, and resources in and around the community.

In 2003, the Pecos Volunteer Fire Department received funding from the National Park Service's Rural Fire Assistance (RFA) Program to acquire personal protective equipment for 24 members of the department. The department now has its members trained to the basic federal wildland firefighter standard and has also trained two crew bosses. With the assistance of RFA funds, the department has improved its ability to address wildland fire in its community and to assist outside agencies, such as neighboring Pecos NHP (NPS 2003).

The Santa Fe County Fire Department supports three fire divisions: EMS (responsible for Regional Paramedic Unit administration), fire prevention, and operations. There are 15 fire districts in the county. The Glorieta Pass Fire District, located in Glorieta at

exit 299 off I-25, provides fire protection services in and around this portion of central-eastern Santa Fe County (Santa Fe County 2005).

A new Eastern Regional Headquarters, located at the intersection of the Old Las Vegas Highway and US-285, was proposed in 2004 to serve the communities and fire districts of Eldorado, Hondo, Glorieta, and Lamy. The Headquarters is planned to operate 24 hours a day, seven days a week, with a fully trained team of paramedics and firefighters, and will support local volunteer firefighters and EMT's staff within Santa Fe County (Santa Fe County 2005).

Sensitivity to Impacts and Potential Constraints

If visitation increases as a result of additional development such as new interpretive facilities or planned site tours; demand for law enforcement, fire protection, and emergency medical services could increase in and around the Glorieta Unit. Increased demand for these services also could result if alternative road alignments facilitate access to previously inaccessible areas between the Glorieta Unit and Village of Pecos and indirectly generate growth in new parts of either Santa Fe or San Miguel counties.

Schools

Characteristics

There are several public schools in both Santa Fe and San Miguel counties that serve the Pecos and Glorieta areas. As described in Community Cohesion, Santa Fe and San Miguel counties allow children living near the county line to choose which school system they will attend (FHWA 1996).

The Pecos Independent School District supports three schools—Pecos Elementary, Middle, and High schools—with a total student population of 883. This school district serves 11 villages (East and West Pecos, Terrero, Colonias, Rowe, La Joya, Glorieta, North and South San Ysidro, San Juan, and Ilfeld). Ninety percent of the students reside in the villages that are located from 5 to 30 miles from the school (Pecos Elementary School 2005).

In the 2004–2005 school year, enrollment at Pecos Elementary School was 380 students in kindergarten through fifth grade. Enrollment at Pecos Middle School (sixth through eighth grade) was 213 students, and enrollment at Pecos High School (ninth through twelfth grade) was 235 students (New Mexico Public Education Department 2005).

The Santa Fe School District serves a student population of 13,735 in 53 elementary, middle, and high schools. The schools closest to the Santa Fe–San Miguel County line are Eldorado Elementary School, Calvin Capshaw Middle School, and Santa Fe High School. In the 2004–2005 school year, enrollment at Eldorado Elementary School was 521 students in kindergarten through sixth grade. Enrollment at Calvin Capshaw Middle School (seventh and eighth grades) was 410 students, and enrollment at Santa Fe High School (grades nine through twelve) was 1,733 students (New Mexico Public Education Department 2005).

Sensitivity to Impacts and Potential Constraints

Schools would only be affected if there were a substantial increase in the permanent population in and around the Glorieta and Pecos areas. Increased demand for schools could result if alternative road alignments were to facilitate access to previously inaccessible areas and indirectly generate growth in new parts of either Santa Fe County or San Miguel County, which in turn could increase enrollment at local schools.

Water Supply and Wastewater

Characteristics

Water Supply

With the exception of water for the City of Las Vegas, all potable water in San Miguel County comes from underground aquifers. The Village of Pecos has a community water system; the majority of county residents, however, rely on domestic wells (San Miguel County 2004).

Outside the City of Santa Fe, water supply in Santa Fe County is about equally distributed between domestic wells and community water supplies, and nearly all county residents rely on groundwater (Santa Fe County 1999). It is assumed that residents residing in the

Santa Fe County portion of the study area rely on groundwater provided by private wells for their water supply.

There are ten known water supply wells within the park, but only four wells within National Park Service jurisdiction are used in park operations. The four wells are located at the administration building, visitor center, trading post, and the Forked Lightning Ranch House. There are no potable water systems under National Park Service jurisdiction in the Glorieta Unit. According to NPS, however, existing dwellings located on private property in the Glorieta Unit probably have small domestic and stock wells (NPS 1995c).

Wastewater

San Miguel County does not provide wastewater services outside of the City of Las Vegas. The majority of San Miguel County residents rely on septic tanks (San Miguel County 2004). It is assumed that residents residing in the Santa Fe County portion of the study area also rely on septic tanks to provide wastewater treatment.

Wastewater systems are available at the park headquarters, visitor center, ranch house and casita, and trading post, located in the Pecos Unit. The systems comprise a combination of septic tanks and drain fields (NPS 1995c). There are no wastewater systems under National Park Service jurisdiction in the Glorieta Unit.

Sensitivity to Impacts and Potential Constraints

Demand for domestic water from wells and for wastewater-treatment systems could increase in and around the Glorieta Unit if visitation were to increase as a result of additional development such as new interpretive facilities or planned site tours. Increased demand for these services could also increase if alternative road alignments were to generate growth in new parts of either Santa Fe County or San Miguel County between the Glorieta Unit and Village of Pecos.

Indications are that existing domestic and community well-water levels and production volumes are declining throughout San Miguel County, and the

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trend is likely to continue because of drought and continued new development (San Miguel County 2004). Therefore, potential development near or in the county could significantly affect local water tables and the availability of water supply.

Solid Waste

Characteristics

San Miguel County partners with adjacent Mora County to the north for regional solid-waste collection services. Residents take their household solid waste to 13 transfer sites located throughout the county (San Miguel County 2004). There are seven solid-waste transfer stations in Santa Fe County; the station closest to Glorieta in the central-eastern portion of the county is in Eldorado, south of I-25 off of US-285 (Santa Fe County 2005).

Sensitivity to Impacts and Potential Constraints

Similar to impacts described in preceding text for water supply and wastewater treatment, demand for solid waste collection services could increase in and around the Glorieta Unit if visitation were to increase as a result of additional development such as new interpretive facilities or planned site tours. Increased demand for these services could also result if alternative road alignments were to facilitate access to previously inaccessible areas in the vicinity of the Glorieta Unit and Village of Pecos. Enhanced access could indirectly generate growth in new parts of either Santa Fe County or San Miguel County.

Utilities and Communication Services

Characteristics

In San Miguel County, Public Service Company of New Mexico (PNM) provides electric and gas service to the incorporated areas of Pecos and Las Vegas. The Mora San Miguel Electrical Cooperative provides electricity outside of PNM's service areas. Rural residents purchase gas or propane or use wood for heating (San Miguel County 2004).

Cable or satellite Internet service is available in the rural parts of San Miguel County. Cell phone service is provided along the I-25 corridor and in some parts

of the county around Las Vegas, but not in others due primarily to the topography and sparsely settled conditions (San Miguel County 2004).

In Santa Fe County, most types of utility infrastructure – including electricity, natural gas, and telecommunications systems – are provided by private companies or cooperatives that are regulated by state and federal governments (Santa Fe County 1999). It is assumed that existing gas, electric, and communication services available to residents in the Santa Fe County portion of the study area are similar to the type of infrastructure described previously for rural residents of San Miguel County.

Sensitivity to Impacts and Potential Constraints

Similar to impacts described previously for water supply and wastewater treatment, demand for natural gas, electricity, and communication services could increase in and around the Glorieta Unit if visitation were to increase as a result of additional development such as new interpretive facilities or planned site tours. Increased demand for these services could also result if alternative road alignments were to facilitate access to previously inaccessible areas in the vicinity of the Glorieta Unit and the Village of Pecos. Enhanced access could indirectly generate growth in new parts of either Santa Fe County or San Miguel County.

Physical Features

Soils

Characteristics

Soils in the Pigeons Ranch area were mapped as Cueva (very stony clay) and Capillo-Rock outcrop complex on hilly to very steep slopes; Ortiz (gravely loam) on gently rolling to steep lands; and Preweitt loam and Rednum loam on nearly level to moderately sloping lands. These soils generally have moderate to slow permeability, medium to very rapid runoff, and severe to very severe erosion hazards (NPS 1995a).

Predominant erosion occurs in the Glorieta Creek watershed (NPS 1995c). The Prewitt loam series is the dominate soil found along the Glorieta Creek drainage. The permeability of the Prewitt loam series

is moderate, runoff is medium, and erosion hazard is severe. The Capillo-Rock outcrop complex is found along the steeper slopes on the south side of Glorieta Creek. Soils characteristics include rapid to very rapid runoff and severe to very severe erosion hazards. These soils are generally dissected with deeply incised arroyos that can carry large volumes of sediment during storm events (FHWA 1996).

Glorieta Creek parallels NM 50 to the south for approximately two miles east of the Glorieta Unit before heading south and converging with the Pecos River. Although soils data in this area have not been collected, soils along the Glorieta Creek drainage may be similar to that described previously in the Glorieta Unit. There are also several areas of steep slopes (defined as greater than 25 percent) in the area south of NM 50 and north of I-25, between the eastern boundary of Glorieta Unit and the Village of Pecos.

Sensitivity to Impacts and Potential Constraints

The characteristics of soils in the Glorieta Unit, particularly in the vicinity of Glorieta Creek, could result in significant limitations to recreation and to construction of facilities, including roads and trails (NPS 1999). Already-severe erosion hazards could be exacerbated from a combination of temporary site disturbance and cut-and-fill activities in the vicinity of Glorieta Creek. In turn, increased erosion could further degrade water quality and have an adverse effect on nearby water resources and aquatic life (see Water Resources and Fish and Wildlife Resources). Erosion hazards could also be encountered along the portions of Glorieta Creek between the Glorieta Unit and Pecos. If project activities disturb more than one acre of land, a storm water pollution prevention plan (SWPPP)—under the National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act (CWA)—would need to be prepared to address erosion control during construction.

Seismicity and Earthquake Hazards

Characteristics

New Mexico has a low-to-moderate level of seismicity. Earthquakes larger than magnitude 6 on the Richter scale have occurred here in the historical

past and could occur again (New Mexico Bureau of Geology & Mineral Resources Website 2001).

The Albuquerque–Santa Fe urban corridor is located within the seismically, tectonically, and volcanically active Rio Grande rift in northern and central New Mexico. This rift extends a distance of approximately 100 miles from Española in the north to Belen in the south and encloses the Rio Grande Valley; portions of Santa Fe, Sandoval, Bernalillo, and Valencia counties; and all of Los Alamos County (Wong et al. 1997).

The Rio Grande rift contains many poorly characterized and potentially active faults. Previous regional and site-specific investigations show that many of these faults exhibit evidence of late Pleistocene or Holocene movement. Because of the recent rapid growth within the Albuquerque–Santa Fe corridor, these faults pose a seismic hazard to a rapidly growing population and industrial complex (Kelson et al. 1997).

Sensitivity to Impacts and Potential Constraints

Earthquake-induced impacts could arise from soil movement and settling or from soil liquefaction during an earthquake. Hazards such as seismically induced landslides and surface rupture could also occur, and steep embankments could fail or slump.

Surface Water and Groundwater

Characteristics

The Glorieta Unit includes a one-mile reach of Glorieta Creek (NPS 1995c). Glorieta Creek originates in the mountains of the Santa Fe National Forest and parallels NM 50 in the park's Pigeons Ranch Subunit (FHWA 1996). As described in "Soils and Geologic Hazards," Glorieta Creek parallels NM 50 to the south for approximately two miles east of the Glorieta Unit before heading south and converging with the Pecos River. An unnamed tributary crosses NM 50 approximately one and one-quarter miles east of the eastern border of the Glorieta Unit and flows into Glorieta Creek. The Pecos River is located east of the Village of Pecos and is not included in the study area.

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

No flow data are recorded or are available for Glorieta Creek. Flow within upper Glorieta Creek and its tributaries is intermittent, with very low flows common during the summer season; while lower Glorieta Creek generally appears to have flow, through flow may be seasonally minimal (i.e., less than 0.1 cubic feet per second) (NPS 1995c). However, intense thunderstorms, that produce flash flood events, can substantially increase water levels in the creek. (NPS 1995a) (also see Floodplains).

San Miguel County contains several groundwater aquifers. Within the park, groundwater is withdrawn from the Madera Formation limestone (NPS 1999). Groundwater is the source of drinking water at the park (see Water Supply).

Sensitivity to Impacts and Potential Constraints

Local streams and arroyos could be susceptible to temporary erosion and sedimentation from construction activity. Increases in impervious area and runoff from newly developed areas could also affect these resources. As the project proceeds, appropriate permits under the CWA will be developed, if necessary (SMA 2004).

The CWA regulates dredge-and-fill activities that have the potential to adversely affect waters of the United States. The act designates authority to the US Army Corps of Engineers (USACE) to issue permits and regulatory guidance governing these activities. Roadway-related crossings of waters in the United States are regulated under Section 404 of the CWA.

Surface and Groundwater Quality

Characteristics

In January 1995, the New Mexico Water Quality Control Commission incorporated the entire length of Glorieta Creek into stream segment 2213 of the Pecos River (20 NMAC, 6.1), thus extending state water quality standards to the entire length of Glorieta Creek. Water-quality standards specific to this segment are for pH, fecal coliform, and total dissolved solids as are standards specific to actual uses. Designated uses

for this stream segment are for irrigation, livestock watering, wildlife habitat, marginal cold-water fishery, and secondary contact recreation² (NPS 1999).

Because of heavy erosion associated with land and channel alterations, water quality is affected within the park (NPS 1999). Limited water-quality data are available for Glorieta Creek, but park staff reports that Glorieta Creek shows evidence of extreme eutrophication³, with thick algal blooms occurring in the spring, summer, and fall. Potential sources of pollution that may contribute to nutrient- and sediment-loading and algal growth include wastewater lagoons (e.g., at the Glorieta Conference Center, located three miles upstream of Pigeons Ranch), residential septic systems along the creek, irrigated agriculture, and livestock grazing) (NPS 1995a, 1995c). Grease, oil, metal, and salts from vehicle traffic and road deicing along NM 50 could also influence water quality in Glorieta Creek (FHWA 1996).

In 1994, NPS began a limited water-quality monitoring program at one site in Glorieta Creek above its confluence with the Pecos River. Instantaneous discharge, water temperature, dissolved oxygen, pH, and specific conductance were measured monthly as part of this initial monitoring effort. In addition, in the mid-1990s, New Mexico Highlands University and the New Mexico Environment Department initiated a two-year study to identify and assess potential water quality problem areas, including existing pollution sources for Glorieta Creek and the Pecos River (NPS 1995c).

The groundwater wells that are the source of the park's drinking water are periodically tested and are in compliance with health standards. However, additional water quality studies have been recommended on the park's groundwater sources (NPS 1999).

Sensitivity to Impacts and Potential Constraints

Transportation improvements to NM 50 could result in increased pollutant runoff from the road into

² Secondary contact recreation is defined as incidental contact with the water, including wading and occasional swimming.

³ The process by which a body of water becomes enriched in dissolved nutrients (as phosphates) that stimulate the growth of aquatic plant life usually resulting in the depletion of dissolved oxygen.

nearby drainages such as Glorieta Creek. Accidental spills of fuel or other liquids during roadway construction could also adversely affect local water quality.

Transportation Features

Characteristics

Transportation Planning History

In 1985, under a separate project not related to this current study, the Federal Highway Administration (FHWA) and New Mexico Department of Transportation (NMDOT) began the planning/design process for reconstruction and widening of NM 50 in response to increased regional development and traffic. By October of 1990, the planning process had produced a document that recommended the road be realigned in the vicinity of Pigeons Ranch to a location that would impact a historic well and stand of trees and affect the wetland surrounding Glorieta Creek. In addition, the character of the road would change from a 26-foot meandering right-of-way with two 11-foot driving lanes to a right-of-way that would range from 120-182 feet with two 12-foot driving lanes, two 8-foot paved shoulders, and two 8-foot surface tapers, 3 feet of which would be paved. This profile would have had potentially significant negative impacts on the integrity of the historical battlefield resources and other cultural and natural resources in the park. Road improvement plans were delayed as the project encountered historic resource and local resident concerns along the corridor.

Largely in response to the highway planning effort, legislation was enacted to expand Pecos National Historical Park to include the Glorieta Unit on November 8, 1990 to preserve the historical resources on the site. This action changed the context of the previous highway planning effort by placing approximately 1.7 miles of the NM 50 reconstruction project within the boundaries of the park subject to review by both the National Park Service and the State of New Mexico Historic Preservation Officer. Discussions involving all of the parties began immediately but it quickly became clear that agreement

would not be reached easily or quickly. As a result, the NMDOT amended the reconstruction project to delete the portion within the park and commenced construction from the Village of Pecos west to the park boundary.

Between 1991 and 1996 a series of meetings, hearings, and discussions were held on the topic of NM 50. The NMDOT began a study in 1993 to assess the feasibility of alternate highway routes as a result of the new constraints placed on the widening of Highway 50 within the battlefield; including bypassing the site entirely and creating a new I-25 interchange. Also in 1993, a NPS historic resource study on the sole remaining structure on Pigeons Ranch called for enhanced protection for the structure from seismic impacts of the adjacent roadway.

In 1996, NMDOT halted the environmental study citing a lack of funds and no feasible alternative among those studied. The September 1996 Environmental Data Investigation Report concluded “...from the information prepared in the DEIS study, from public and agency input received over the course of the study and from the lack of available funding, that an alternative outside of the existing roadway corridor would not be in the best interest of the NMSHTD or the traveling public. Likewise, the NMSHTD/FHWA concluded that any improvements along the existing roadway corridor within the Pecos National Historical Park, Pigeons Ranch Subunit do not appear to be compatible with the NPS preservation and interpretation commitments.”

As a result, the study was suspended. The consequence of this impasse is that the stretch of essential highway within the park does not meet current standards, and the park is unable to develop and interpret the story for which this unit was established. The park receives numerous complaints each year on both topics – from the travelers who must use the road as well as from historians, the preservation community, school groups and visitors who are frustrated that they cannot visit this significant piece of Civil War and Southwest history.

The only improvement to the specific segment of NM 50 in the park over the past 20 years has been

ANALYSIS OF EXISTING CONDITIONS AND CONSTRAINTS

an overlay that included paving the existing gravel shoulder, and widened each lane by approximately one foot.

Traffic and Safety Information

The NM 50 roadway through the park has been identified by NMDOT as needing major maintenance or reconstruction. NM 50 is an important rural and commuter route and a major roadway for east-west trips in the Glorieta-Pecos area to access I-25. It is also a tourist route providing access to Glorieta Battlefield, Pecos NHP, Pecos Canyon Recreational Area, and National Forest lands.

Annual Average Daily Traffic (AADT) in 2003 was 4,108 vehicles; AADT for 2004 is 4,129; projected AADT for 2014 is 5,273, and for 2024 it is 6,417. Traffic is projected to increase at a rate of approximately 2.8 percent per year. Truck traffic (heavy commercial) represented 5 percent of the AADT in 2003. Truck traffic is projected to increase at a rate of 4.4 percent per year, reaching a total of approximately 5.7 percent of all trips in 2014 and 6.2 percent in 2024.

There are no pedestrian or bicycle facilities along or across NM 50. Visitors often park on the shoulder or informal pull off areas and wait for a break in traffic to access the Pigeons Ranch house and Sharpshooters Ridge. The park receives numerous complaints each year about the unsafe conditions for pedestrians to access the Glorieta Unit. The rate of collisions has exceeded the state average. Figure 3 shows accident locations on NM 50. Figure 3 also shows traffic volumes in 2003, 2004, and 2014.

Access Considerations

Several parcels of private property and residences have access via unimproved lanes off NM 50 within the Glorieta Unit. The Mora-San Miguel Electrical Cooperative has a power line that traverses the Glorieta Unit and requires access for maintenance and inspection. Table 4 depicts ownership of land within the park.

Sensitivity to Impacts and Potential Constraints

Deterioration of the existing roadway surface, increasing population in the Pecos Valley, and the perception of unsafe conditions by the public will demand close analysis for alternatives that consider no action and/or use of the existing NM 50 corridor.

Transportation improvements to NM 50 need to consider projected growth and increases in auto, heavy truck, pedestrian, and bicycle traffic. Constrained space in the existing NM 50 corridor increases the potential for conflicts between the various travel modes. Perhaps most importantly, is the public perception that the corridor is unsafe, which will need to be addressed in each alternative.

Improvements or changes to the alignment of NM 50 must consider and maintain access to private property and utilities.

Table 4 - Ownership of Land within the Glorieta Unit of Pecos National Historical Park

Ownership	Acres	Percent
NPS	180.22	52.82%
Private	146.89	43.05%
Museum of NM	2.12	0.62%
State of NM	11.96	3.51%

DEVELOPMENT OF STUDY ALTERNATIVES & PRELIMINARY EVALUATION OF ALTERNATIVES

Introduction

The alternatives development process was a collaborative effort between the steering committee and the consultant team, directly shaped by public involvement. The process for developing alternatives was largely based on the New Mexico Department of Transportation's Location Study Procedures, A Guidebook for Alignment and Corridor Studies (hereafter referred to as "Guidebook"), developed in 2000 to assist the preparation of alignment and corridor studies throughout New Mexico. The Guidebook prescribes three phases. Phase A, the Initial Evaluation of Alternatives, is described in detail below. According to the Guidebook, the primary objectives of Phase A are: "(1) verification of the purpose and need for an action, (2) development of a range of potential alternatives that meet the purpose and need, and (3) elimination of alternatives that are clearly not feasible. Other important Phase A elements are the development and implementation of an agency coordination and public involvement program and the determination of the appropriate level of effort for subsequent environmental documentation and processing."

Phase B, Detailed Evaluation of Alternatives, and Phase C, Environmental Documentation and Processing, have not yet been completed for this project. Phases B and C are discussed in further detail under the "Next Steps" discussion at the end of this study.

Initial Development of Early Concepts and Screening

Early Concepts

Fifteen concepts were developed by the study team based on public input and ongoing analysis of existing conditions. These concepts were presented



Pigeons Ranch adobe building adjacent to NM 50

to the public in June 2005. The concepts represented the wide range of comments and input heard from stakeholders and the public at Workshop Series # 1 in January 2005. The input ranged from wanting minimal changes to NM 50 to wanting a new alignment for NM 50 and a new interchange with Interstate 25. The varied fifteen concepts were preliminary and were not evaluated based on detailed engineering, environmental impacts, or other criteria. The concepts were displayed in three sets categorized as:

- Set One: Low Build, No Build, and No Action Concepts
- Set Two: Realignment/Bypass Concepts
- Set Three: New Route Possibilities – Between NM 50/Pecos and Interstate 25

Below is a description of each concept. Figures 4-6 show each of the concept sets.

Set One: Low Build, No Build, and No Action Concepts

- Concept A – Low Build: Gateways, Traffic Calming, and Pull Offs on Existing Alignment
- Concept B – Slight Shift of Highway to the South in the Vicinity of Pigeons Ranch Building

DEVELOPMENT OF STUDY ALTERNATIVES & PRELIMINARY EVALUATION OF ALTERNATIVES

- Concept C – No Build: Manage by Education, Enforcement, and Encouraged Use of NM 63 as the Commuter Route to I-25
- Concept D – No Action: No Improvements and No Management Activities

These concepts include “minimalist” approaches to resolving transportation issues, such as increased enforcement, education, and low build improvements such as traffic calming and speed reduction programs. It should be noted that “low build” approaches do not always equate to “low cost.” Although upfront capital costs may be lower, additional staffing, maintenance, and operational costs may result in increased long-term life cycle costs.

The “no action” concept was also included in this set. Evaluation of a “no action” alternative is required by the National Environmental Policy Act (NEPA) and allows the opportunity to evaluate the potential results and impacts that might occur if no actions are taken. Set One is shown in Figure 4.

Set Two: Realignment/Bypass Concepts

- Concept E – Realignment in the Vicinity of the North Boundary of Glorieta Unit
- Concept F – Shift of Highway Alignment to the South at the Base of the Hill
- Concepts G-1 and G-2 - Extend Old Denver Highway and Connect to West End of NM 50
- Concept H – Flyover of I-25 and Connection to South of Glorieta Interchange
- Concepts I-1 and I-2 – Realign NM 50 to Ascend Ridge and Join New Frontage Road (connects to Concept G)
- Concept J – Improve and Widen Existing Underpass

These concepts include various approaches to realigning NM 50 in the vicinity of the Glorieta Unit of Pecos National Historical Park, while relying on the existing Glorieta interchange for access to Interstate 25. As such, some of these concepts could be categorized as “bypasses” involving the realignment of NM 50 around the core of the park. Set Two is shown in Figure 5.

Set Three: New Route Possibilities – Between NM 50/Pecos and Interstate 25

- Concept K – Centrally Located Linkage Between NM 50 and I-25 and New Interchange
- Concept L – Pecos Western Outskirts Linkage between NM 50 and I-25 and New Interchange
- Concept M – Create New Access Point to NM 63 and New Half Interchange Southeast of Pecos

These concepts include various possibilities for creating a new route between the Pecos valley and Interstate 25 between exits 299 and 307. Such a route would provide a new conduit for commuter traffic to and from Santa Fe. Although the current route of NM 50 through the Glorieta Unit would continue to provide access to park visitors and local residents, it could be downgraded to a local access road. Each of these concepts would involve construction of a new interchange with NM 50 at Interstate 25. Set Three is shown in Figure 6.

Initial Screening of Concepts

The proposed screening approach was presented at Workshop Series #2 in June 2005. Evaluation criteria were developed from public input at Workshop Series #1 and guidelines in the Guidebook. The purpose of the criteria was to identify aspects to evaluate and compare the concepts above and further develop specific alternatives. The screening approach compared each concept to the evaluation criteria. The evaluation assigned a “positive” or “negative” valuation to each criterion for each concept. The evaluation criteria used to screen early concepts and then refined later for use in evaluating alternatives is shown in Figures 7, 9 and 12.

Further Evaluation of Concepts and Alternatives Development

In August 2005, the NM 50 Transportation Study team met to review concepts A through M presented at the June public workshop series. With consideration of public comments obtained at

the June workshop series and with insights gained from preliminary analysis of the concepts, the team developed a set of alternatives to take forward through more detailed study. Public comments on the fifteen concepts are included in Section 2 – Agency Coordination and Public Involvement; and in Appendix A, Outreach Summary Report.

The team discussed that there would be some “givens” under any of the alternatives developed for further study (elements common to all alternatives) including:

- Traffic calming and/or speed reduction on the old NM 50 alignment through the park could occur under any alternative if its current function changes to a lower volume travelway.
- With any new alignment or bypass, the old alignment of NM 50 in the park would remain open to local traffic. It could become a park road (federal status), a county road, or could be retained as an alternate state route, with the new route providing more direct access between Pecos and Interstate 25. If the old alignment is retained as an alternative state route, heavy use could be discouraged through a number of actions, such as signing, realignment of the through-traffic flow, or other improvements.

Below is a description of the alternatives that evolved from evaluation of the initial concepts identified to move forward after the August 2005 screening. Figure 7 shows the evaluation matrix for Concepts A through M developed by the study team. Figure 8 shows Alternatives 1 through 5.

Alternative # 1

There was initial broad agreement that Concepts C and D should be combined into one “No Build/No Action” Alternative. Evaluation of a “No Action” alternative is required by NEPA. The team recognized that a “No Build/No Action” alternative may not meet the purpose and need of the project as well as other alternatives. Under Alternative #1, NM 50 would be retained as a state highway in its current

configuration and with its current cross section.

Ongoing maintenance may improve shoulders and other aspects of the route to a minimal level. This alternative would need to rely on long-term traffic management to reduce congestion and disruption of traffic through the park and core of the Glorieta Battlefield. Trucks would have to continue to be routed along this alignment (except during temporary bridge work).

Alternative # 2

The team agreed that Concepts A and B could be combined into a “Low Build” alternative.

The team recognized that a “Low Build” alternative may not meet the purpose and need of the project as well as other alternatives, but that it was reasonable to take a low build alternative forward for further evaluation within the range of alternatives, and evaluation of a “Low Build” alternative is recommended by NEPA guidelines. Under this low build alternative, NM 50 would be retained as a state highway in its current alignment and performing its current function. Minor shifts in alignment could be expected (for example near the remaining Pigeons Ranch structure).

As with Alternative #1, long term traffic management and traffic calming improvements would be needed to minimize congestion and disruption of traffic through the park and core of the battlefield. Lane and shoulder widening would be expected (to meet FHWA/NMDOT basic standards). Signing could be added to help calm traffic and orient travelers to the park. Interpretive waysides/pull offs and trailhead parking areas could be added (with interpretation related to the battlefield and other topics).

Alternative # 3; Alternative # 4; Alternative #5

The team evaluated Concepts E through M, applying the list of criteria developed previously with public input. The team filled out an evaluation matrix for these concepts with notes related to each concept’s

DEVELOPMENT OF STUDY ALTERNATIVES & PRELIMINARY EVALUATION OF ALTERNATIVES

compatibility and/or reinforcement of each criterion. During the course of this discussion and evaluation the team determined that these alternatives would move forward through more detailed study and analysis:

Figure 7 includes the matrix with comments on each of the concepts. Additional comments regarding Concepts E through M included the following.

- Concepts G-1 and I-1 were eliminated from further consideration because the level of potential impacts would be too major and the needs to acquire private property too extensive.
- 4F considerations would be greater under any alternative that continued to take an alignment through the core of the park, but not if the alignment would provide a net benefit to the park and its ongoing use by the public.

The team took a field trip to further evaluate on the ground conditions related to Concepts I, K, and L. After reviewing conditions in the field, the team returned to the work session to further discuss the range of alternatives to be moved forward and those concepts that should be eliminated from further consideration.

It was acknowledged that the area identified as Concept L-1 and L-2 could shift to the west slightly to encompass an existing road access, but after field study to evaluate this area and the road access, the team determined that Concepts L-1 and L-2 should be eliminated from further study due to the following issues (also see matrix comments on Figure 7):

- This route would take travelers heading west towards Santa Fe too far out of direction to the east, reducing its viability as a feasible connection – because people wouldn't use the route – they would continue to use the current alignment of NM 50 instead.
- Potential alignments through this area would have extensive impacts to natural, cultural and archaeological resources.
- This would be the longest new route segment/alignment and would require a new interchange, so it would be one of the most costly alternatives if it moved forward through further study.

- There were several home sites and residential developments in the vicinity of the L-1 and L-2 study area that could be impacted by an alignment in this area.

Preliminary Evaluation of Alternatives

At Workshop Series #3 in October 2005, participants commented on each of the five alternatives by filling out an evaluation matrix. The criteria in the evaluation matrix were based on public input from Workshop Series #1 as well as refinement by the project team at the August work session. The steering committee/study team provided an initial analysis in the matrix format for workshop participants to reference, but the public was encouraged to provide their own independent analysis and evaluation on blank matrices that were distributed. The study team's reference matrix is provided as Figure 9. A summary of the public's evaluation of each alternative is provided below.

Alternatives Evaluation

Alternative 1: Manage by Education, Enforcement, & Encouraged Use of NM 63 - No Improvements and No Management Actions

- *Does it meet the project purpose and need?* – The majority of meeting participants did not think Alternative 1 met the purpose and need of the project.
- *Police, fire, and emergency access* – The majority of meeting participants thought Alternative 1 would have negative impacts on emergency access.
- *Preservation of archaeological, cultural, and historical resources* – The majority of meeting participants felt that preservation would be worse under Alternative 1 than under current conditions.
- *Protection of aquatic and biological resources* – Most meeting participants were neutral and thought conditions would not change.
- *Neighborhood cohesion and community values* – Meeting

participants were divided on whether or not this alternative would impact neighborhood cohesion. Some thought it was positive while others thought it was negative or somewhat negative.

- *Right-of-way considerations* – The majority of meeting participants did not think this alternative would impact right-of-way (no new right-of-way required).
- *Interpretive opportunities for the Glorieta Unit* – The majority of meeting participants thought Alternative 1 would have a negative impact on interpretive opportunities.
- *Relative cost considerations* – The majority of meeting participants thought Alternative 1 was positive in relation to cost.

Alternative 2: Gateways, Traffic Calming, and Pull Offs on Existing Alignment - Slight Shift of Highway to South

- *Does it meet the project purpose and need?* – The majority of meeting participants did not think Alternative 2 met the purpose and need of the project.
- *Police, fire, and emergency access* – The majority of meeting participants were neutral on this alternative's impact on emergency access.
- *Preservation of archaeological, cultural, and historical resources* – The majority of meeting participants thought preservation would be worse under Alternative 2 than under current conditions.
- *Protection of aquatic and biological resources* – Most meeting participants thought protection of these resources would be worse under this alternative.
- *Neighborhood cohesion and community values* – Most meetings participants thought this alternative would have a positive impact on neighborhood cohesion.
- *Right-of-way considerations* – The majority of meeting participants did not think this alternative would impact right-of-way (no new right-of-way required).

- *Interpretive opportunities for the Glorieta Unit* – The majority of meeting participants thought this alternative would have negative impacts on interpretive opportunities.
- *Relative cost considerations* – The majority of meeting participants thought Alternative 2 was positive in relation to cost.

Alternative 3: Extend Old Denver Highway; Connect to West End of NM 50; and Realign to Ascend Ridge and Join New Frontage Road

- *Does it meet the project purpose and need?* – Meeting participants were split on whether Alternative 3 would meet the purpose and need. Some thought it would, while others thought it would not.
- *Police, fire, and emergency access* – The majority of meeting participants thought Alternative 3 would have a somewhat positive or positive impact on emergency access.
- *Preservation of archaeological, cultural, and historical resources* – The majority of meeting participants thought preservation would be worse under this alternative than under current conditions.
- *Protection of aquatic and biological resources* – Most meeting participants thought protection of these resources would be worse under this alternative.
- *Neighborhood cohesion and community values* – Most meetings participants thought this alternative would have a negative impact on neighborhood cohesion.
- *Right-of-way considerations* – The majority of meeting participants thought this alternative would have negative impacts related to right-of-way (more right-of-way needed).
- *Interpretive opportunities for the Glorieta Unit* – The majority of meeting participants thought this alternative would have somewhat positive impacts on interpretive opportunities.
- *Relative cost considerations* – The majority of meeting participants thought this alternative would be negative in relation to cost.

Alternative 4: Extend Old Denver Highway and Connect to West End of NM 50 to Create a Centrally Located Linkage Between NM 50 and I-25

- *Does it meet the project purpose and need?* – Meeting participants thought this alternative would meet the project purpose and need.
- *Police, fire, and emergency access* – The majority of meeting participants thought this alternative would have somewhat negative or negative impacts on emergency access.
- *Preservation of archaeological, cultural, and historical resources* – Meeting participants were split on whether or not this alternative would have negative or positive impacts on these resources.
- *Protection of aquatic and biological resources* – Most meeting participants thought protection of these resources would be worse under this alternative.
- *Neighborhood cohesion and community values* – Most meetings participants thought this alternative would have negative impacts on neighborhood cohesion.
- *Right-of-way considerations* – The majority of meeting participants thought this alternative would have negative impacts related to right-of-way (more right-of-way needed).
- *Interpretive opportunities for the Glorieta Unit* – The majority of meeting participants thought this alternative would have somewhat positive impacts on interpretive opportunities.
- *Relative cost considerations* – The majority of meeting participants thought this alternative would be negative in relation to cost.

Alternative 5: Centrally Located Linkage Between NM 50 and I-25 - New Interchange

- *Does it meet the project purpose and need?* - Meeting participants thought this alternative would meet the project purpose and need.
- *Police, fire, and emergency access* - The majority of meeting participants thought this alternative would have positive impacts on emergency access.

- *Preservation of archeological, cultural, and historical resources* – The majority of meeting participants thought this alternative would have positive impacts on these resources.
- *Protection of aquatic and biological resources* – The majority of meeting participants thought this alternative would have positive impacts on these resources.
- *Neighborhood cohesion and community values* – Most meetings participants thought this alternative would have positive impacts on neighborhood cohesion.
- *Right-of-way considerations* – The majority of meeting participants thought this alternative would have positive impacts related right-of-way (right-of-way would be easier to acquire).
- *Interpretive opportunities for the Glorieta Unit* – The majority of meeting participants thought this alternative would have positive impacts on interpretive opportunities.
- *Relative cost considerations* – Meeting participants were split on whether or not cost would be a negative or positive consideration.

Phase A Close Out Alternatives Analysis

Following the October 2005 public workshop series, the steering committee (NPS, NMDOT, and FHWA) met to determine if any alternatives should be eliminated from further study. Prior to the meeting, the committee further evaluated the potential alignments and preliminary cost estimates developed for the five alternatives, depicted in Table 5 and Figure 10. The steering committee also reviewed public input and comments gathered at the workshop series related to the five alternatives. The five alternatives were compared again to the evaluation criteria, and this ongoing technical analysis and the public input from the October 2005 workshop were factored into the assessment. The matrix shown in Figure 12 depicts this last round of alternatives evaluation as part of the Phase A study effort. The matrix summarizes the committee's technical analysis, as well as the public's assessment

Table 5 - Preliminary Cost Estimates

Alternative	Description	Glorieta Interchange Upgrades (Millions)	Gateways, calming, pull-offs (Millions)	Rehabilitation/Maintenance*						New Highway Segment						New Tunnel	New Interchange (Millions)	ROW Acquisition and Relocation (Millions)	Total (Millions)
				Length (mi.)			Cost per mile (Millions)	Total Cost (Millions)	Length (mi.)			Cost per mile (Millions)	Total Cost (Millions)						
				NM 50	Old Denver	Total			NW	SE	Total								
1	No physical improvements. Manage by education, enforcement, and encouraged use of NM 63. *Maintenance cost is for necessary work to maintain NM 50 if no other improvements are done. Cost is based on budgeted maintenance for a 10-year period.			2.6		2.6	x	*	\$0.34			0	x	\$2.0	\$0			\$0.34	
2	Slight shift of NM 50 to the south in the vicinity of Pigeon's Ranch (0.3 mile). Rehabilitate the remainder of NM 50 to Glorieta Interchange. Add gateways, traffic calmings, and pull-offs on existing NM 50 alignment.	\$4.0	\$0.4	1.8		1.8	x	\$1.0	\$1.8			0	x	\$2.0	\$0			\$6.2	
3	Upgrade Glorieta Interchange & NM 50 to vicinity of Windmill Hill (0.7 mile). New connection between NM 50 and Old Denver Highway (0.6 mile). Rehabilitate Old Denver Highway (0.4 mile). New highway between Old Denver Highway and NM 50 (0.4 mile) through a tunnel (1,000 linear feet).	\$4.0		0.7	0.4	1.1	x	\$1.0	\$1.1	0.6	0.4	1	x	\$2.0	\$2.0	\$11.0	\$2.6	\$20.7	
4	Upgrade Glorieta Interchange & NM 50 to vicinity of Windmill Hill (0.7 mile). New connection between NM 50 and Old Denver Highway (0.6 mile). Rehabilitate Old Denver Highway (1.3 miles). New highway between Old Denver Highway and NM 50 east of the La Joya community (0.6 mile).	\$4.0		0.7	1.3	2	x	\$1.0	\$2.0	0.6	0.6	1.2	x	\$2.0	\$2.4		\$4.75	\$13.15	
5	New connection between NM 50 and I-25 east of the La Joya community (0.75 mile). Create a new interchange and rehabilitate Old Denver Highway at the intersection with the new connection (0.5 mile).				0.5	0.5	x	\$1.0	\$0.5		0.75	0.75	x	\$2.0	\$1.5		\$15.0	\$8.7	\$25.7

Note: These costs estimates are preliminary and will be refined as the design progresses.

* Maintenance cost obtained from NMDOT is based on the following:
 Recurring annual routine maintenance costs of \$15,000 = \$150,000 over ten years.
 Pavement preservation costs recurring every 5 years - \$60,000 = \$120,000 over ten years.
 Bridge deck maintenance recurring every 10 years - \$70,000 = \$70,000 over ten years.
 Total cost over ten years = \$340,000.

DEVELOPMENT OF STUDY ALTERNATIVES & PRELIMINARY EVALUATION OF ALTERNATIVES

of how each alternative compared to the evaluation criteria developed earlier in the study process based on public input at that time. October 2005 workshop participants were given blank matrices to fill out to represent their assessment of the alternatives and this input was referenced in the evaluation by the study team.

Highway Cross Section

As identified in this study, under any of the alternatives, the NM 50 highway corridor is in need of improvements. Even under the “No Action” alternative, the NMDOT would continue to maintain the highway and eventually may widen the roadway shoulders where possible as part of ongoing maintenance work. Under the other action alternatives, proposed improvements would either upgrade the existing roadway design or involve the development of new segments of roadway built to highway standards. Figure 11 depicts the proposed cross-section for improvements to the existing highway or for development of new highway segments. There are areas within the existing highway corridor through the Glorieta Unit of the park where this cross-section would not fit due to the constrained physical space within the right-of-way. (Figure 11 also depicts the existing highway cross-section in the park.) The proposed cross-section would be constructed only where possible and shoulders would continue to stay narrower than standard in constrained areas.

Preliminary Cost Estimates

Preliminary cost estimates were developed for the five alternatives based on conceptual alignments and initial Phase A study evaluation (see Table 5). These estimates represent a planning level of accuracy and likely will be modified as the project analysis and design continues to evolve. Annual maintenance costs and costs associated for upgrading the existing Glorieta interchange (in Alternatives 2, 3 and 4) are included. The lower costs associated with Alternative 1, “No Action” relate to ongoing maintenance and operations of the existing highway segment. The higher estimated cost associated with Alternative 3 is relate to the anticipated need for a “cut and cover” tunnel. The higher estimated costs associated

with Alternative 5 relate to the proposal for a new interchange with I-25. All costs are reflected in 2006 dollars and are preliminary and subject to further refinement as the study process continues into Phase B.

Alternatives Moving Forward into Phase B

Due to the relatively high potential for negative effects identified in the preliminary technical analysis and perceived by participants in the October 2005 public workshop series, the steering committee determined that Alternatives 3 and 4 should be eliminated and that Alternatives 1, 2, and 5 should move forward for further analysis in Phase B of the study effort. A brief review of each of the five alternatives and a summary of public input related to each one follows.

Alternative 1

Evaluation of a “No Action” alternative is required by the National Environmental Policy Act (NEPA). This alternative can not be eliminated although initial assessment has determined that it likely does not meet the purpose of and need for the study. Therefore, the study team determined that Alternative 1 should move forward into the Phase B study efforts. In Phase B, Alternative 1 will become Alternative I.

Alternative 2

There was a mixed evaluation from the public regarding Alternative 2. Some participants thought it was more positive and some thought it was more negative. Alternative 2 provides the opportunity to further evaluate a lower cost and less construction-intensive alternative. The study team determined that Alternative 2 needed further analysis and therefore should move forward to the next steps of the Phase B study. Alternative 2 will become Alternative II in Phase B.

Alternatives 3 and 4

Many Workshop Series #3 participants felt that these alternatives would have predominantly negative

impacts under the established evaluation criteria. It was determined that Alternative 3 potentially could impact both the community and the cultural resources in the Glorieta Unit. It was determined that Alternative 4 potentially could have the most negative impact on the community surrounding the Glorieta Unit. Therefore, the study team recommended eliminating Alternatives 3 and 4 from further consideration.

Alternative 5

Most Workshop Series #3 participants felt that Alternative 5 would result in generally positive effects under the established evaluation criteria. Although there potentially could be some impacts to private property owners, most participants felt such impacts would be less under this alternative than under others and that there would be definite benefits to the community and region. The study team determined Alternative 5 needed further analysis and should move forward to the next steps of Phase B. Alternative 5 will become Alternative III in Phase B.

This report concludes Phase A of the study process. Phases B and C are currently not fully funded. Funds remain to cover a portion of the Phase B study, so in the coming months, the team will focus on engineering evaluation of the alternatives.

The NPS, FHWA, and NMDOT are committed to moving the project forward, seeking funding, and continuing to work together. The steering committee will continue to meet on a monthly basis. Phases B and C will be completed as soon as funding is available. A summary of these future phases, as described in the NMDOT *Location Study Procedures, A Guidebook for Alignment and Corridor Studies*, is provided below.

Phase B: Detailed Evaluation of Alternatives

Phase B of the study process will further develop and evaluate Alternatives 1, 2, and 5. This phase also will confirm which alternatives will be carried forward into Phase C. In Phase B, alternatives are developed in greater engineering detail. A detailed analysis is also conducted to determine their performance, right-of-way needs, costs, and the potential environmental, social and cultural consequences of each. Agency coordination and public involvement continue to be essential components of the evaluation and decision-making process.

Phase B is divided into two major efforts including engineering analysis and environmental investigations and analysis. The engineering analysis involves the preparation of conceptual engineering drawings that establishes right-of-way requirements and area of impact. The environmental analysis focuses on the detailed analysis of the direct and indirect impacts that would occur with each alternative. At this stage in the study process, the engineering and environmental investigations include in-depth quantitative analyses and serve as the basis for preparing an EIS or EA. Typically, all of the alternatives that are evaluated during Phase B are included in the environmental document prepared for Phase C, although some alternatives may be eliminated as Phase B progresses.



The project next steps include further engineering and analysis of NM 50.

Phase C: Environmental Documentation and Processing

Phase C is the preparation of an environmental assessment (EA) or an environmental impact statement (EIS) and subsequent processing that concludes the corridor study process and allows the selected alternative to be advanced to the preliminary and final design phase. The technical analyses and information compiled in Phases A and B provide the basis for the environmental document along with agency and public issues identified through the public involvement process. Phase C is not intended to involve extensive new analysis. Rather, it summarizes and discloses the information already compiled. Additional analysis and refinements to the design concept should be limited to issues that are necessary to respond to agency and public comments received at the conclusion of Phase B.

Phase C also includes intensive public involvement. The EA or Draft EIS will be available for public review. Copies of the EA or EIA are generally made available at libraries, community centers, and municipal governments, as well as on-line. The document will be available from all the partner agencies. Following development and publishing of the Draft EIS or the EA, and response to public comments, the NMDOT and the FHWA will issue either a Final EIS or a Record of Decision for the EA. If the project requires a EIS, then the agencies would issue a Final EIS.

Figure 1 — Study Area

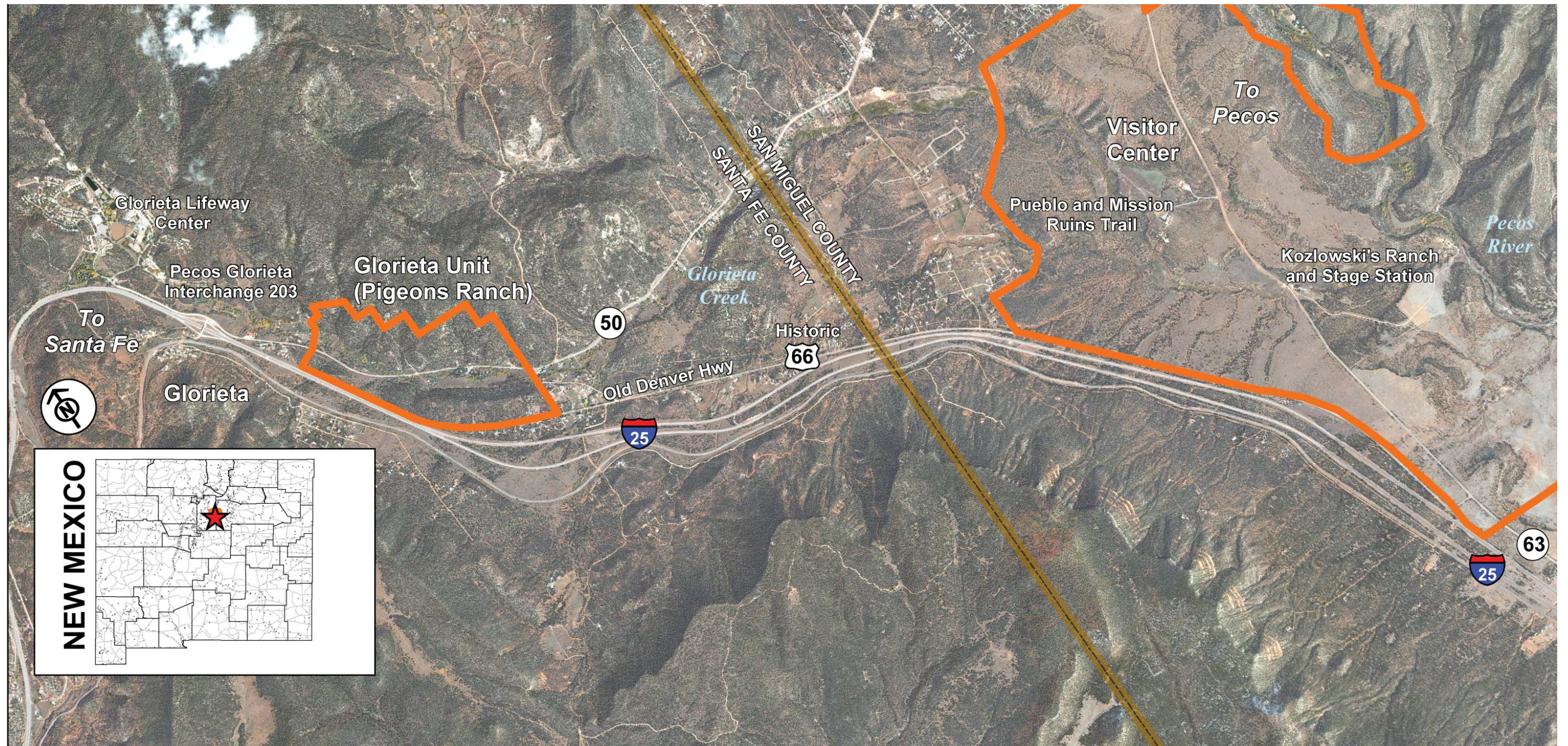


Figure 2 — Phase A Study Process and Schedule

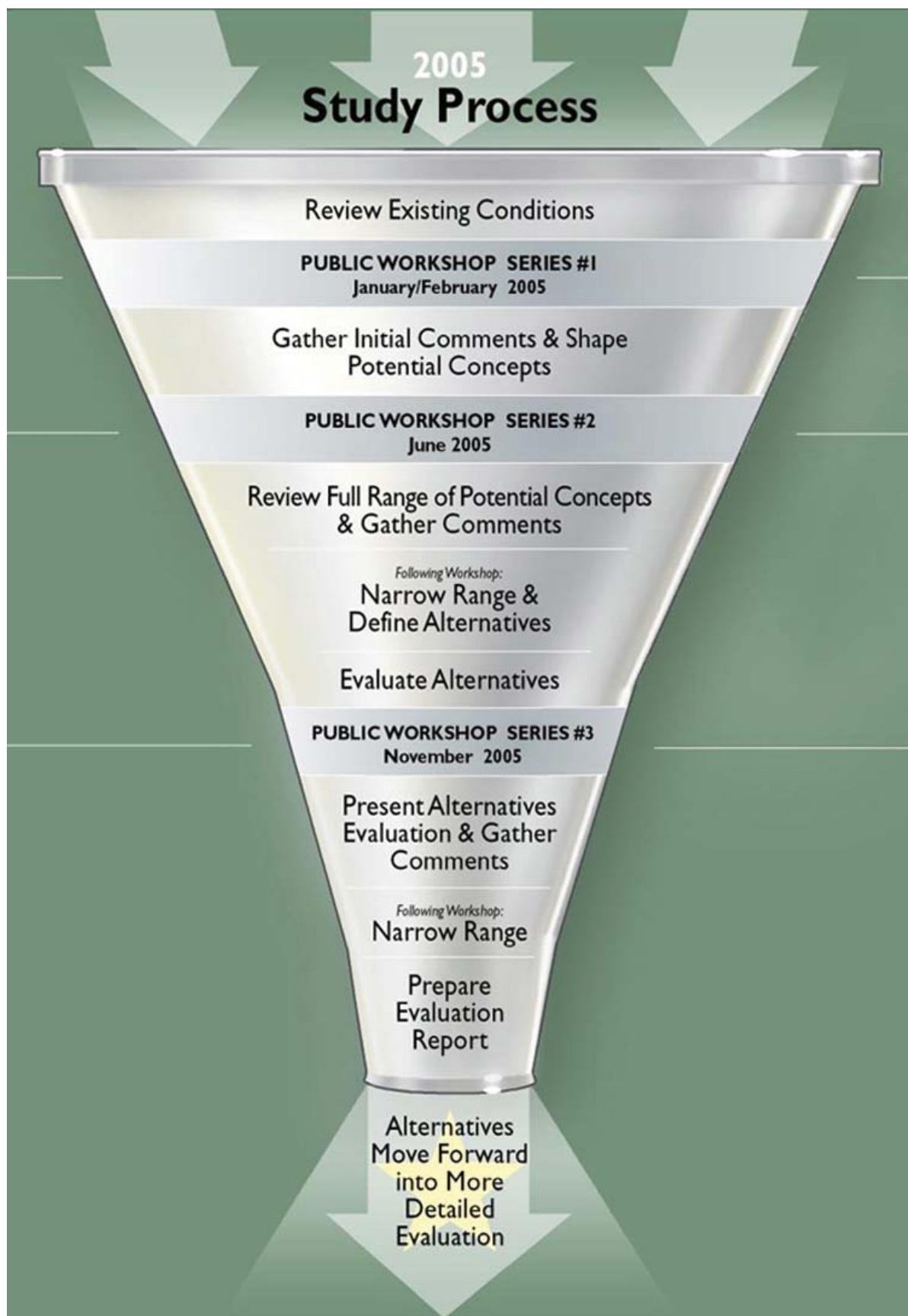


Figure 3 — Traffic/Accident Data



Figure 4 — Transportation Study Concepts - Set One

Transportation Study Concepts • Set One

“LOW BUILD,” “NO BUILD,” and “NO ACTION”

 Pecos National Historical Park

- A Low Build** – Gateways, Traffic Calming and Pull-offs on Existing Alignment
- B Low Build** – Slight Shift of Highway to South
- C No Build** – Manage by Education, Enforcement, and Encouraged Use of NM 63 as the Commuter Route to I-25
- D No Action** – No Improvements and No Management Actions

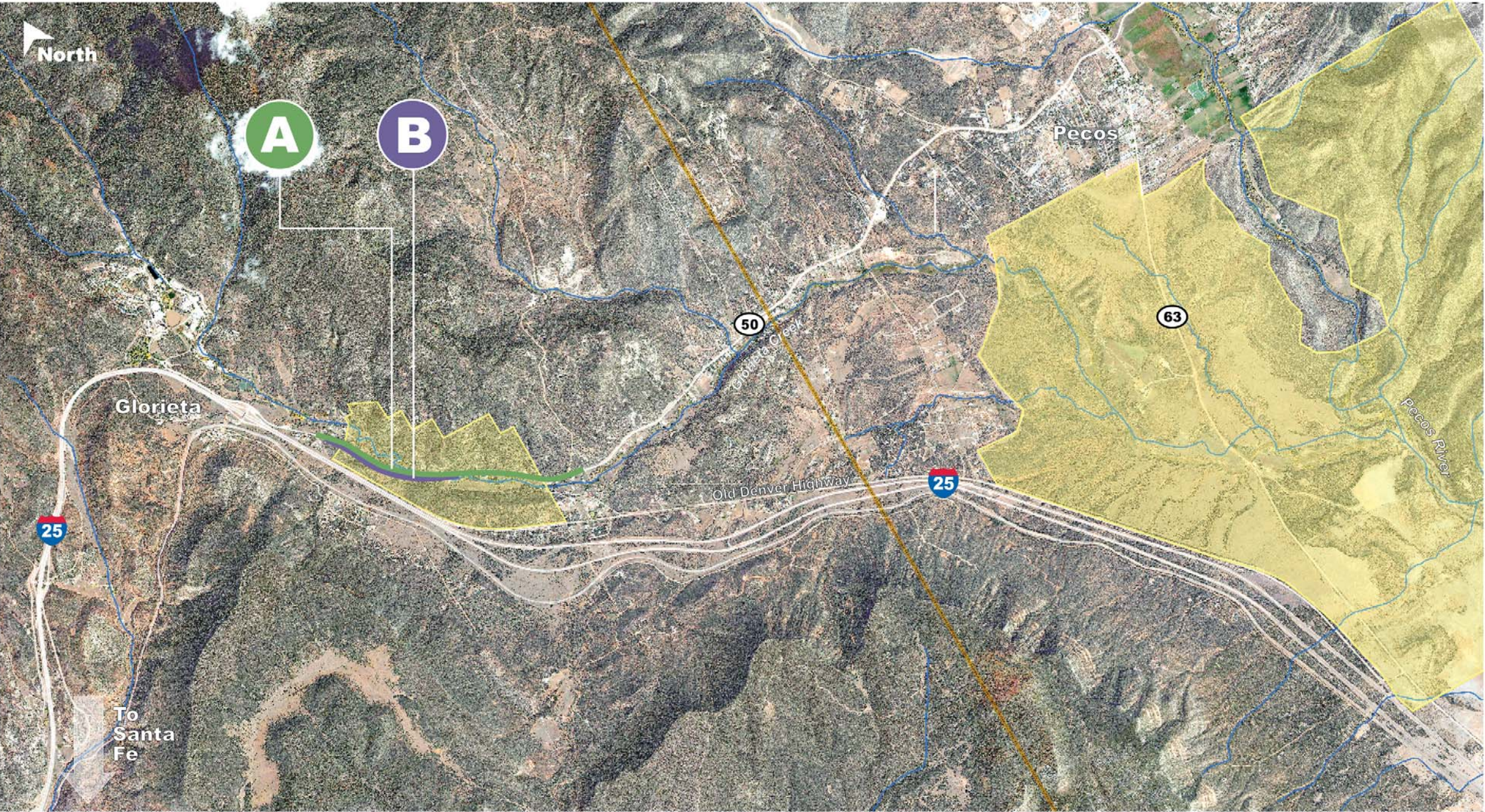










Figure 5 — Transportation Study Concepts - Set Two

Transportation Study Concepts • Set Two
REALIGNMENT / BYPASS POSSIBILITIES

 Pecos National Historical Park

-  E Realignment in the Vicinity of the North Boundary of Glorieta Unit
-  F Shift of Highway Alignment to the South at the Base of the Hill
-   G-1 G-2 Extend Old Denver Highway and Connect to West End of NM 50
-  H Flyover of I-25 and Connection to South of Glorieta Interchange
-   I-1 I-2 Realign NM 50 to Ascend Ridge and Join New Frontage Road (Connects to Concept G)
-  J Improve and Widen Existing Underpass

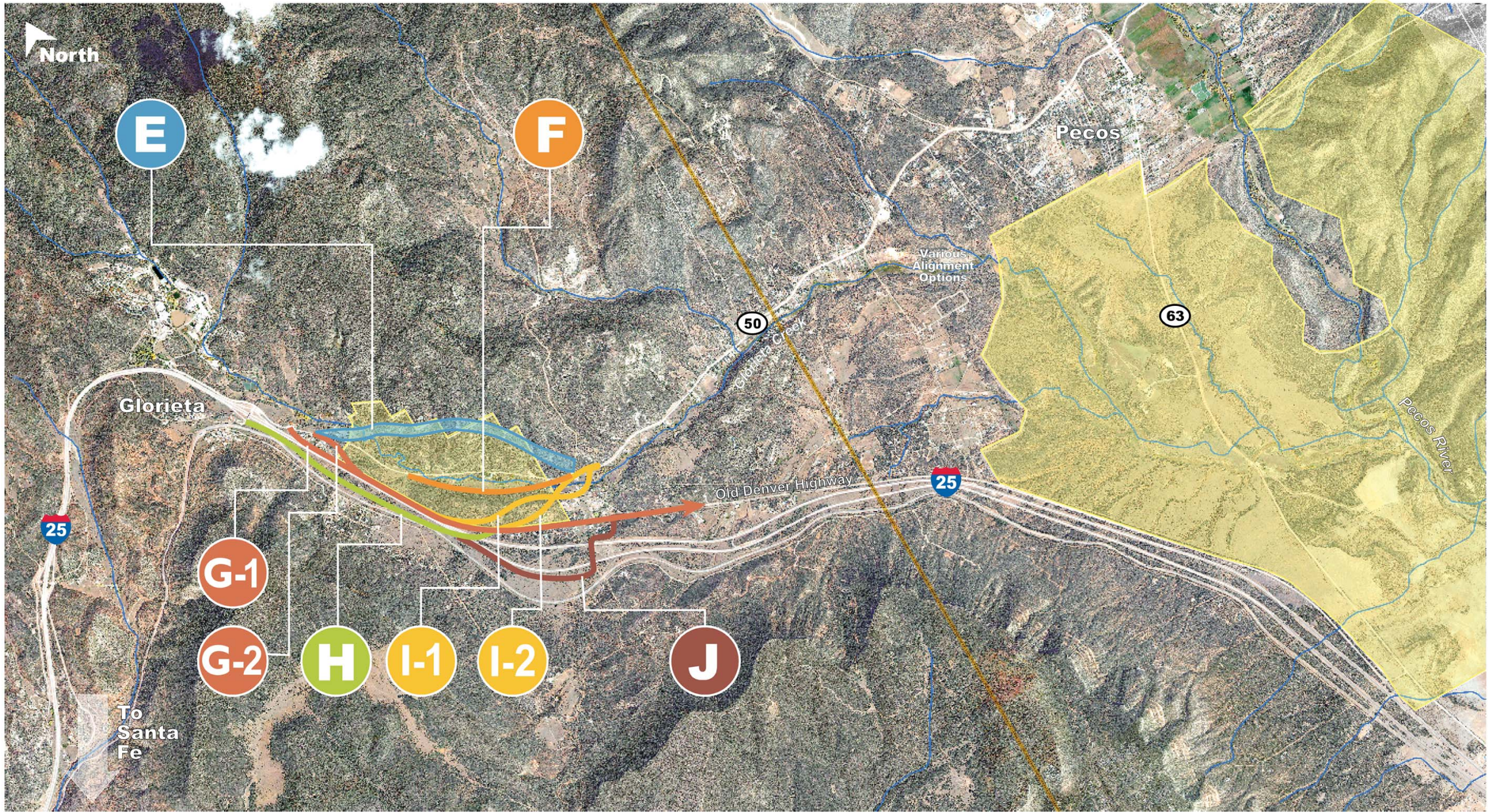






Figure 6 — Transportation Study Concepts - Set Three

Transportation Study Concepts • Set Three

NEW ROUTE POSSIBILITIES BETWEEN PECOS & I-25

 Pecos National Historical Park

-  Centrally Located Linkage Between NM 50 and I-25 and New Interchange
-  Pecos Western Outskirts Linkage Between NM 50 and I-25 and New Interchange
-  Create New Access Point to NM 63 and New Half Interchange Southeast of Pecos
-  New Interchange

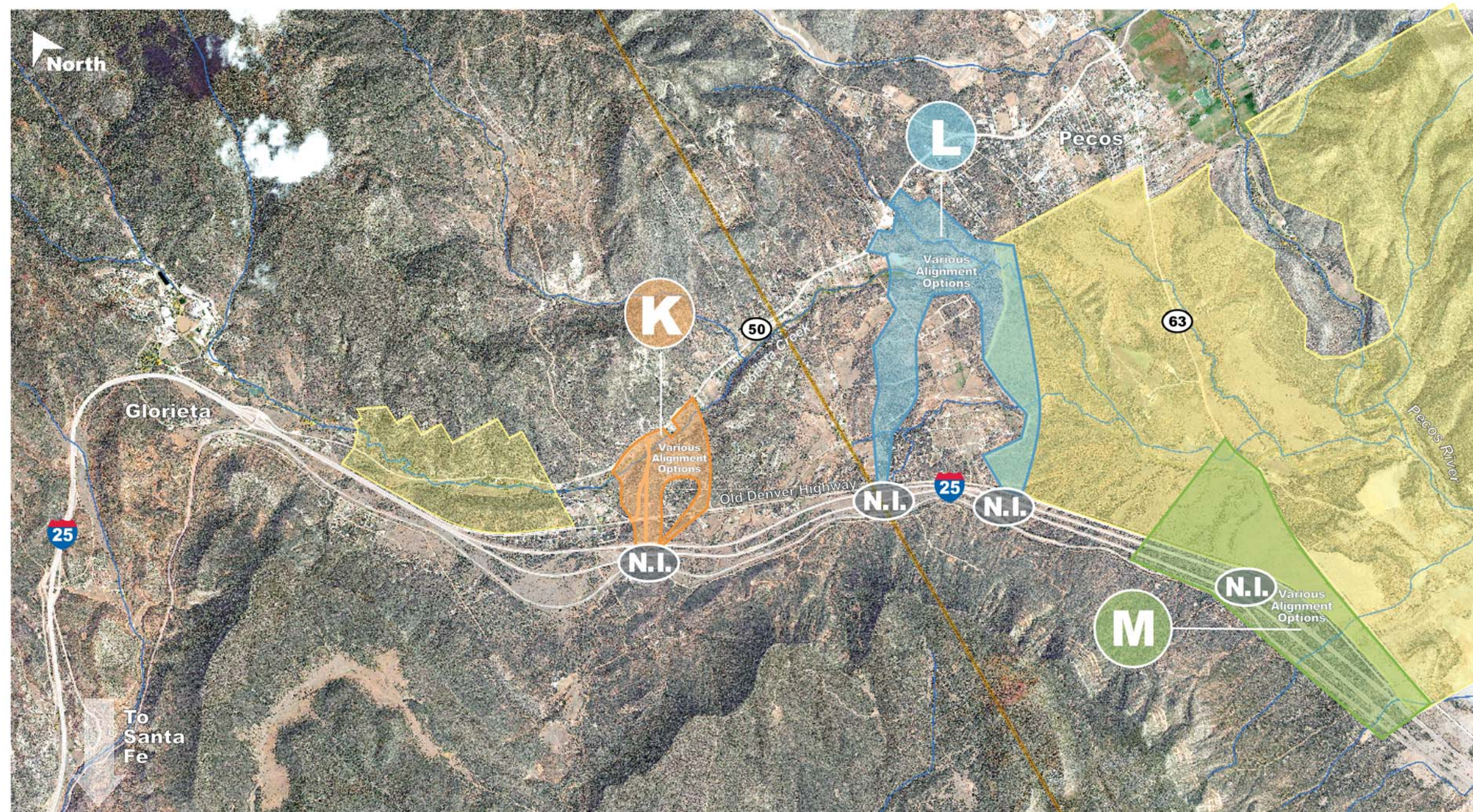


Figure 7 — Evaluation Matrix for 15 Concepts

Evaluation Matrix - 15 Concepts Presented in June														
Alternatives	Concept A	Concept B	Concept C	Concept D	Concept E	Concept F	Concept G	Concept H	Concept I	Concept J	Concept K	Concept L-1	Concept L-2	Concept M
Evaluation Criteria	Low Build (traffic calming & pull offs)	Low Build (slight alignment shift)	No Build (management options only)	No Build	New Alignment at North Boundary	Shift South to Base of Hill	Extend Old Denver Highway and Connect to West NM 50	Flyover of I-25 and Connect South of Glorieta	Realign to Ascend Ridge and Join New Frontage Road	Improve and Widen Existing Underpass	Centrally Located Linkage Between NM 50 and I-25	Pecos Western Outskirts Linkage Between NM 50 and I-25	Western Outskirts Linkage Between NM 50 and I-25 – Park Edge	Create New Interchange to I-25 Between Pecos and Rowe
Does it meet the project Purpose & Need?	No	No	No	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Police, Fire and Emergency Access	Somewhat Negative	Somewhat Negative	Negative	Somewhat Negative	Neutral	Neutral	Somewhat Positive	Somewhat Positive	Neutral	Somewhat Positive	Positive	Positive	Positive	Neutral
Preservation of Archaeological, Cultural, and Historical Resources	Negative	Negative	Negative	Negative	Negative	Negative	Somewhat Positive	Neutral	Negative	Neutral	Somewhat Positive	Somewhat Negative	Negative	Somewhat Negative
Protection of Aquatic and Biological Resources; Topography and Terrestrial Resources	Somewhat Positive	Somewhat Negative	Somewhat Positive	Somewhat Positive	Negative	Negative	Neutral	Negative	Negative	Negative	Neutral	Somewhat Negative	Negative	Somewhat Negative
Neighborhood Cohesion and Community Values; Economic Opportunities	Positive	Somewhat Positive	Positive	Positive	Neutral	Somewhat Negative	Neutral	Neutral	Neutral	Somewhat Negative	Neutral	Somewhat Negative	Somewhat Positive	Positive
Right-of-Way Considerations	Positive	Somewhat Positive	Positive	Positive	Negative	Negative	Positive	Negative	Somewhat Negative	Somewhat Negative	Somewhat Negative	Negative	Somewhat Negative	Somewhat Negative
Interpretive Opportunities for the Glorieta Unit	Neutral	Negative	Somewhat Negative	Negative	Somewhat Positive	Neutral	Somewhat Positive	Somewhat Positive	Somewhat Negative	Somewhat Positive	Positive	Positive	Positive	Positive
Relative Cost Considerations	Positive	Positive	Positive	Positive	Negative	Somewhat Positive	Neutral	Negative	Somewhat Negative	Negative	Somewhat Negative	Negative	Negative	Somewhat Negative
Transportation Safety and Operations, Noise and Air Quality, and Other Considerations/ Comments	Traffic calming is only feasible if another route handles the majority of traffic. Could be combined with another route.	Impacts historic well and potentially private property.		Traffic and roadway continue to get worse.	Topographic constraints, aesthetics and drainage issues – major concerns.	Negative -- aesthetics.	Site is already disturbed.	Flawed -- needs connection to NM 50. Would require the expensive construction of overpass structures.	4F considerations major	Flawed -- needs connection to NM 50. Would require expensive new bridges on I-25 and have major impacts on drainage.	Improved access to Glorieta Mesa. Best preservation of Glorieta Unit. Some impact to private land, but open areas of land means that minimal to no removal of homes may be needed. This concept provides good opportunities for economic development.	Best preservation of Glorieta Unit. Major impacts in current area shown on maps – homes and residential developments. Too far out of direction. This concept provides good opportunities for economic development.	Best Glorieta preservation, but impacts main park unit negatively. 4F issues related to park lands/ historic and cultural resources, but good that it is not private land. Too far out of direction. This concept provides good opportunities for economic development.	Too far out of direction. 4F issues related to park lands/ historic and cultural resources.
NEW COMBINED ALTERNATIVES	Alternative 2		Alternative 1				Alternative 3		Alternative 3		Alternative 4 Frontage Road and Connection to NM 50			
							Alternative 4 Frontage Road and Connection to NM 50				Alternative 5 New Interchange			

Figure 8 — Alternatives 1 - 5

Transportation Study Alternatives

 Pecos National Historical Park

- 1** Manage by Education, Enforcement, Encouraged Use of NM 63
No Improvements and No Management Actions
- 2** Gateways, Traffic Calming and Pull-offs on Existing Alignment
Slight Shift of Highway to South
- 3** Extend Old Denver Highway and Connect to West End of NM 50
Realign to Ascend Ridge and Join New Frontage Road
- 4** Extend Old Denver Highway and Connect to West End of NM 50
Centrally Located Linkage Between NM 50 and I-25
- 5** Centrally Located Linkage Between NM 50 and I-25 and New Interchange



Figure 9 — Matrix for Evaluating Alternatives Moving Forward

Alternatives	I - No Build / No Action (previously C & D) Study Team Assessment	2 – Low Build (previously A & B) Study Team Assessment	3 – Frontage Road (previously G2 & I2) Study Team Assessment	4 – Frontage Road & New Connection (previously G2 & K) Study Team Assessment	5 – New Connection & Interchange (previously K) Study Team Assessment
Does it meet the project Purpose & Need?	No	No - Unless combined with alt.'s 3,4 or 5	Yes	Yes	Yes
Police, Fire and Emergency Access	Neutral	Neutral	Somewhat Positive	Somewhat Positive	Positive
Preservation of Archaeological, Cultural, and Historical Resources	Negative	Negative	Somewhat Negative	Somewhat Positive	Somewhat Positive
Protection of Aquatic and Biological Resources; Topography and Terrestrial	Somewhat Positive	Neutral	Somewhat Negative	Somewhat Negative	Somewhat Negative
Neighborhood Cohesion and Community Values; Economic Opportunities	Positive	Positive	Neutral	Negative	Somewhat Negative
Right-of-Way Considerations	Positive	Positive	Negative	Negative	Negative
Interpretive Opportunities for the Glorieta Unit	Negative	Negative	Somewhat Positive	Somewhat Positive	Positive
Transportation Safety and Operations	Negative	Somewhat Negative	Neutral	Neutral	Positive
Relative Cost Considerations	Positive	Somewhat Positive	Somewhat Negative	Somewhat Negative	Somewhat Negative

Figure 10 — Refined Alternatives 1 - 5, Preliminary Analysis

Transportation Study Alternatives

 Pecos National Historical Park

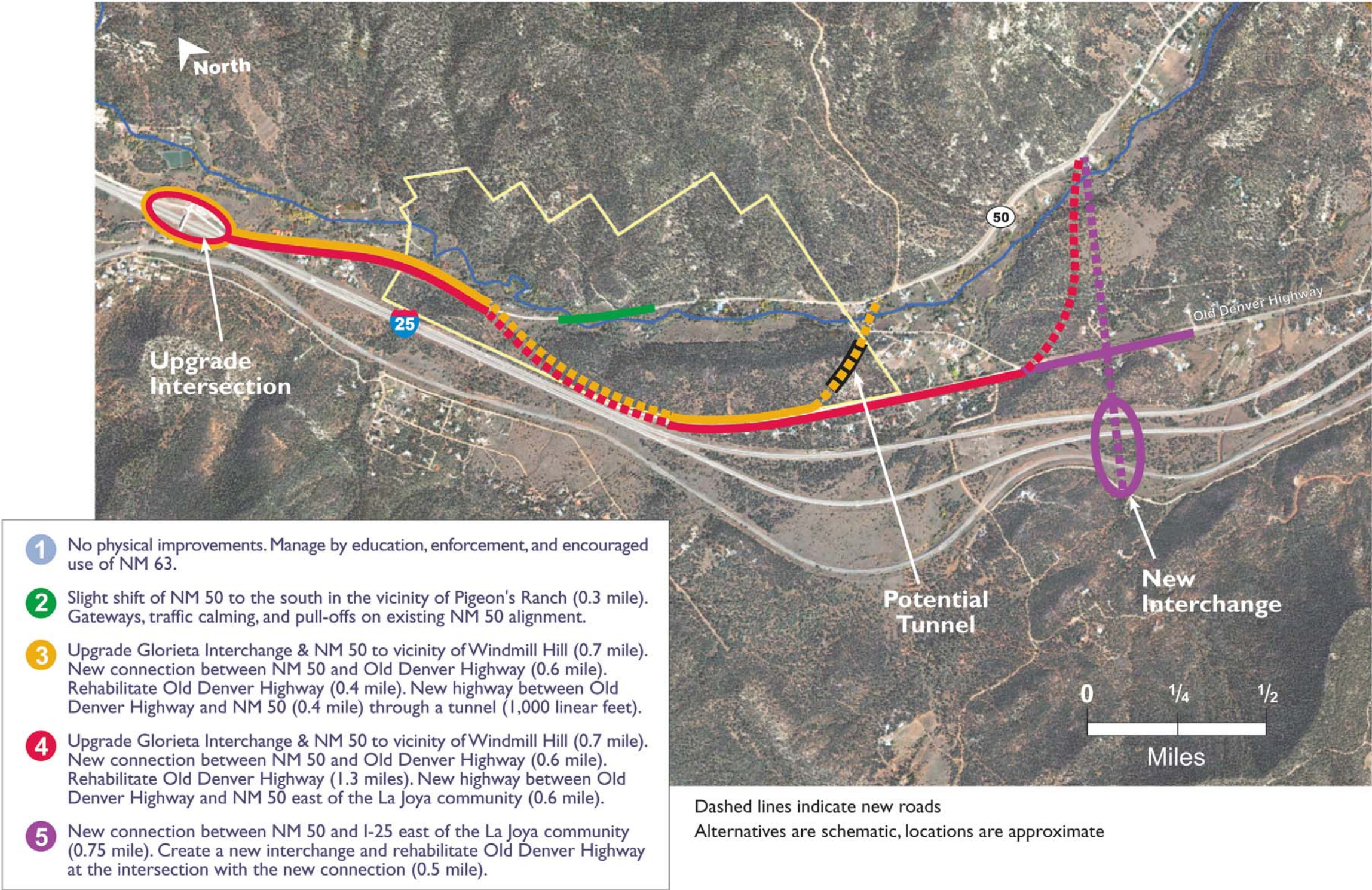


Figure 11 — Existing Roadway and Proposed Design Cross-sections

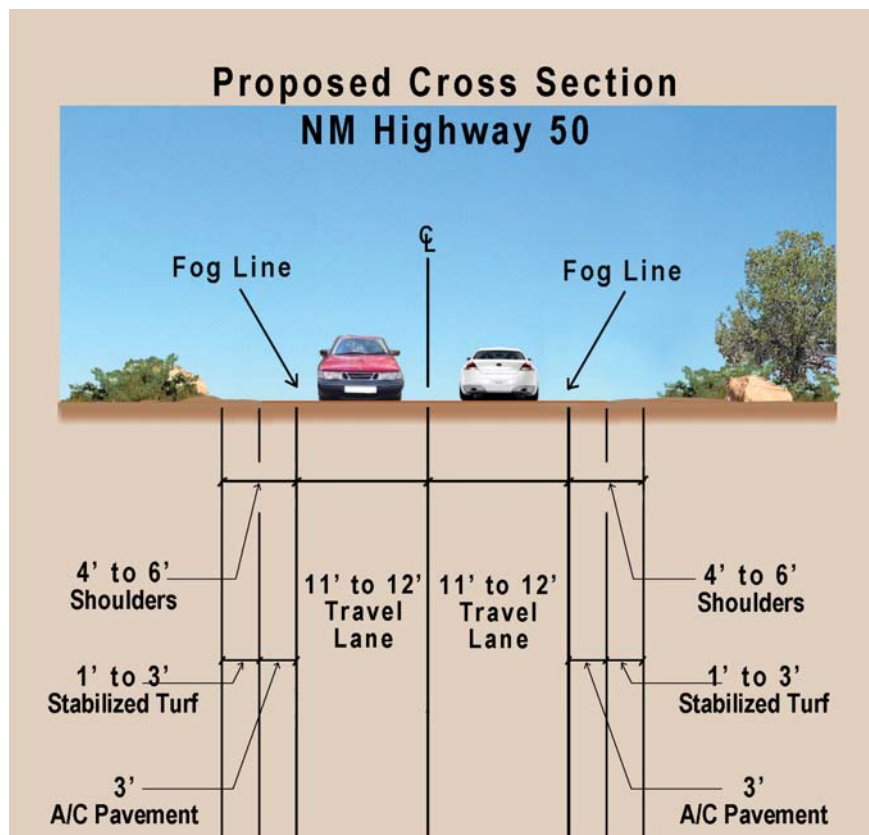
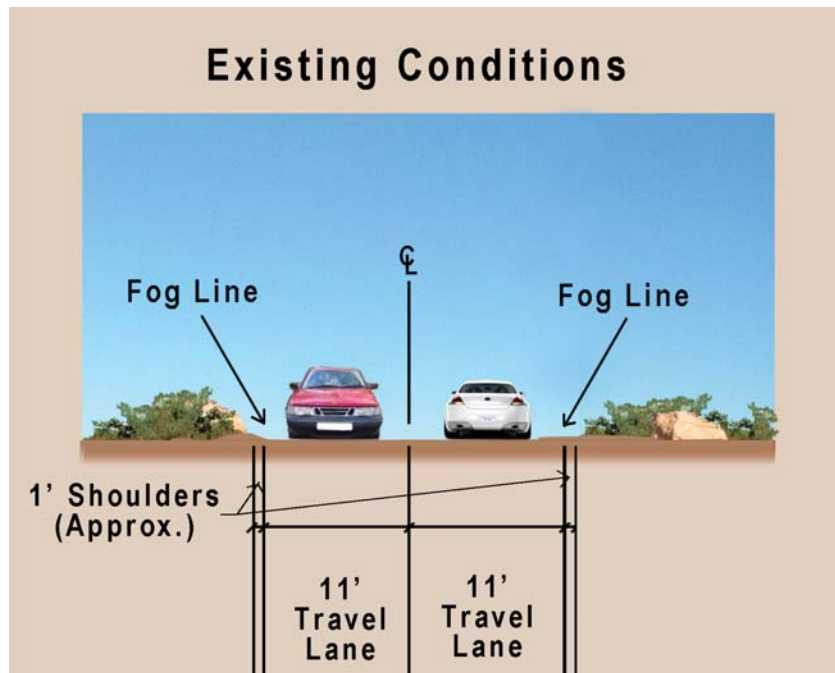


Figure 12 — Final (Phase A) Alternatives Analysis

Phase A Close Out Alternatives Analysis

Evaluation Criteria	Alternatives				
	1	2	3	4	5
Does it meet the project Purpose and Need?	No	Needs Further Study	Yes	Yes	Yes
Police, Fire and Emergency Access	N	N	+	+	++
Preservation of Archaeological, Cultural, and Historical Resources	--	--	-	-	++
Protection of Aquatic and Biological Resources; Topography and Terrestrial Resources	+	N	-	-	-
Neighborhood Cohesion and Community Values; Economic Opportunities	N	N	--	--	+
Right-of-Way Considerations	++	++	--	--	-
Interpretive Opportunities for the Glorieta Unit	--	--	+	+	++
Transportation Safety and Operations	--	-	++	++	++
Relative Cost Consideration	L	M	H	H	H
Alternatives Moving into Phase B	*	*			*

LEGEND

Possible Effects:

++ Very Positive Effects

+ Positive Effects

N Neutral or No Change

- Negative Effects

-- Very Negative Effects

H High

M Moderate

L Low